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The journal serves the publication of papers on Insecta, Myriapoda and Arachnoidea.
Subscription rate: D.Fl. 140.— per year.

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INHOUD VAN DEEL 118

Achterberg, C. van. — A revision of the tribus Blacini (Hymenoptera, Braconidae, Helconinae) 159

Burger, H. C. — Key to the European species of *Brachycaudus,* subgenus *Acaudus* (Homoptera, Aphidoidea), with redescriptions and a note on *B. persicae* 99

Hollander, J. den. — The growth of larvae of *Tipula oleracea* Linnaeus, 1758 (Diptera, Tipulidae) 67

Hollander, J. den. — The phenology and habitat of the species of the subgenus *Tipula* Linnaeus in the Netherlands (Diptera, Tipulidae) 83

Linnavuori, R. — Studies on African Heteroptera 43

Lith, J. P. van. — Neotropical species of *Psen* and *Pseneo* (Hymenoptera, Sphecidae, Psenini) 1

Willemse, F. — Studies on the acridoid genera *Opiptacris* Walker and *Bumacris* Willemse (Orthoptera, Acridoidea) 117

Register 325

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INHOUD

J. P. VAN LITH. — Neotropical species of *Psen* and *Pseneo* (Hymenoptera, Sphecidae, Psenini), p. 1-41, fig. 1-37.

Tijdschrift voor Entomologie, deel 118, afl. 1 Gepubliceerd 06.VI.1975

NEOTROPICAL SPECIES OF PSEN AND PSENEO (HYMENOPTERA, SPHECIDAE, PSENINI)

by

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ABSTRACT

The following new species from Central and South America are described and illustrated: *Psen (Psen) metallicus* (♂), *paranaensis* (♀ and ♂) and *erythrocnemus* (♀ and ♂) and *Psen (Pseneo) canalicus* (♀), *auriger* (♀ and ♂), *aureolus* (♀ and ♂), *funicularius* (♂), *magnificus* (♀), *taschenbergi* (♀ and ♂), *auriventris* (♀) and *eliasi* (♀ and ♂). Keys to all American species, supplementary descriptions, illustrations of male genitalia and new records are given.

Since Malloch's revision of the Nearctic Psenini (1933), a study of the North American *Pseneo* was published by Krombein in 1950. Cameron (1891) described eight Psenini from Mexico, six of which belong to the subgenera *Psen* and *Pseneo*. More recently a few Central American species were published by Pate (1946) and Bohart & Grissell (1969). From South America only two species, both belonging to *Pseneo* (Taschenberg, 1875, and Brèthes, 1910), were known.

The total number of Psenine forms from North and South America now amounts to over 100 (partly still unpublished), of which 35 occur in Central and South America. Many institutions and private collectors kindly sent me their material for study. Of course, I am aware that there are still many unsorted Psenini waiting for a name label in other museums and also that the collections which I could study usually contain only small samples of the Neotropical Psenine fauna. Yet I hope that the keys presented in this paper may form a useful basis for further studies of the Neotropical Psenini.

There are certainly good reasons to consider *Psen* and *Pseneo* distinct genera, as Bohart & Grissell (1969) do. However, pending the solution of some problems relating to Palaearctic and Indo-Australian Psenini, I prefer to maintain, provisionally at least, *Psen* and *Pseneo* as subgenera of *Psen* Latreille, in accordance with Malloch (1933) and Gittins (1969). Gittins' key to the genera and subgenera is apparently based on Nearctic forms and needs some re-construction to include also the Neotropical species.

I am much indebted to the authorities of the museums and to the private collectors who entrusted me with their material. In particular I am grateful to the institutions who sent me valuable types (museums of Buenos Aires, Cambridge (Mass.), Halle). They are mentioned in the following list, together with the symbols used in the text. I am also much obliged to Mr. Colin R. Vardy of the British Museum (Natural History), London, who was always very helpful to me, especially during my visits there.

AMNH — The American Museum of Natural History, New York, N.Y., U.S.A., J. G. Rozen, Jr. and Mrs. M. Favreau
BM — British Museum (Natural History), Department of Entomology, London, U.K.; L. A. Mound, C. R. Vardy
CNC — Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada; J. Barron, L. Masner, C. M. Yoshimoto
CRB — C. R. Baltazar collection, Manila, Philippine Islands
CU — Cornell University, Department of Entomology and Limnology, Ithaca, N.Y., U.S.A.; L. L. Pechuman, A. C. Miller
GRF — G. R. Ferguson collection, 1972; now in Entomological Museum of the Oregon State University
HT — H. and M. Townes collection, American Entomological Institute, Ann Arbor, Michigan, U.S.A.
IML — Instituto Miguel Lillo, Tucumán, Argentina; J. A. Haedo, A. Willink
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USNM — National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.; P. D. Hurd, K. V. Krombein, A. S. Menke
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ZMB — Zoologisches Museum der Humboldt Universität, Berlin, Germany; E. Königsmann
ZMC — Universitetets Zoologiske Museum, Copenhagen, Denmark; O. Lomholdt

Subgenus Psen Latreille, 1796

Eight representatives of *Psen* s.str. are known from the Neotropical region including Mexico; three are only South American and are described as new species in the present paper.

In the subgenus *Psen* the lateral epicnemial carinae are not always bent backwards below and the acetabular carina is not always incomplete or absent, as I thought earlier (Van Lith, 1959). Some of the species discussed here have a complete acetabular carina,

the epicnemium being shaped as in *Pseneo,* but the males have long fasciculate hairs on the apical margin of the third and fourth sternites, as is characteristic for the subgenus *Psen*.

Key to the species of the subgenus *Psen*

(Females of *metallicus* and *unifasciculatus* and males of *irwini, venetus, pulcher* and *montivagus* unknown)

1. Pronotum with long lobular projections. Acetabular carina complete. Scutum coarsely punctate. Petiole slightly longer than first tergite. Pygidial area broadly triangular, surface coriaceous, on either side at least two rows of punctures. Black, propodeum with gold and green reflections. Male unknown. El Salvador, Honduras, Mexico . . . . . *irwini* Bohart & Grissell
— Pronotum without projections 2
2. Acetabular carina incomplete or absent. Pygidial area of female more broadly triangular and surface coriaceous (to be confirmed for unknown female of *metallicus*) 3
— Acetabular carina complete. Pygidial area of female narrowly triangular, shining, at most very faintly or only apically coriaceous (to be confirmed for unknown female of *unifasciculatus*) 6
3. Propodeum with slight greenish-metallic shine, tempora and mesopleura with some bronze reflections. Acetabular carina incomplete. Petiole over 2½ times as long as first tergite. Scutum coarsely striato-punctate. Base and apex of petiole dark reddish-brown, legs and base of antennae including scape pale reddish-brown. Pubescence of face pale golden, of rest of body brownish-golden. Hind margin of tergites 3 and 4 with long, dark, fasciculate hairs. Female unknown. Peru . *metallicus* sp. nov.
— Propodeum black, no distinct metallic reflections. No acetabular carina. Petiole shorter. Face silvery 4
4. Pygidial area of female on either side with at least two rows of punctures. Gaster red, petiole black; underside of antennae, mandibles, tibiae and tarsi largely reddish-brown, sometimes hind femora entirely fulvous. Scutum finely punctate. Petiole about 1⅓ or 1½ times as long as first tergite. Antennal segments 6—13 of male with tyloidea. Nearctic . . . . . *monticola* (Packard)
— Pygidial area of female with one distinct lateral row of punctures. Petiole about twice as long as first tergite. Gaster black, petiole black or dark reddish . . . 5
5. At least petiole reddish or dark reddish, following segments black; in female base of antennae including scape, hind legs and fore and mid tibiae and tarsi reddish, in male scape and legs brown. Scutum rugoso-punctate, laterally more finely separately punctate. Nearctic . . . . . *erythropoda* (Rohwer)
— Petiole black. Base of antennae below, excluding scape, reddish, tarsi pale. Scutum coarsely rugoso-punctate, antero-laterally with fine separated punctures. Sternites 3 and 4 of male with long, dark, fasciculate hairs. Mexico . . *striolatus* (Cameron)
6. Scutum finely punctate or striate. Petiole at most 1⅔ times as long as first tergite 7
— Scutum coarsely sculptured. Petiole nearly twice or over twice as long as first tergite 8
7. Black. Scutum with fine punctures in rows, large interstices. Scutellum almost impunctate. Petiole about 1⅓ times as long as first tergite. Only fourth sternite of male with fasciculate soft hairs. Nearctic . . . . . *barthi* Viereck
— Uniform cyaneous. Scutum sparsely finely punctate, discally and posteriorly finely longitudinally striate, scutellum with scattered punctures. Petiole about 1⅔ times

as long as first tergite, longer than hind femur. Male unknown. Cuba . *venetus* Pate

8. Pubescence of mesosternum golden-brown. Face golden. Femora more or less reddish 9
— Pubescence of mesosternum whitish or yellowish-grey. Femora black 10
9. Legs including trochanters and base of flagellum reddish. Interantennal tooth protruding, laterally flattened. Scutum densely striato-punctate, scutellum punctate only, interstices often a few times size of punctures, mesopleura almost impunctate. Male unknown. Mexico . . . . . *pulcher* (Cameron)
— Tibiae, tarsi, foreside of femora and base of flagellum reddish. Interantennal tooth pyramid-shaped. Scutum densely rugoso-punctate. Scutellum punctate in female, in male partly rugoso-punctate, anteriorly with shining interstices. Mesopleura of female almost impunctate, of male finely punctate. Eyes of male broader than tempora, in lateral view. Apical margin of fourth sternite with golden fasciculate hairs. Brazil . . . . . *erythrocnemus* sp. nov.
10. Scutellum rugoso-punctate, a few shining interstices, in male anterior half with larger shining interstices. Scutum densely striato-punctate. Postocellar area in both sexes much raised, finely punctate. Mesopleura very finely punctate. Face pale golden in both sexes, pubescence of mesosternum yellowish-grey. Underside of scape and base of flagellum reddish-brown in female, blackish in male. Tibiae of female reddish, of male brownish. Sternites 3—4 of male with golden-brown fasciculate hairs. Brazil . . . . . *paranaensis* sp. nov.
— Scutellum shining, with large separate punctures. Scutum coarsely rugoso-punctate, stronger than in *paranaensis*. Postocellar area little raised, distinctly punctate, punctation of mesopleura slightly stronger. Face silvery. Pubescence of mesosternum whitish. Antennae including scape black. Foreside of fore and mid tibiae brown. Male unknown. Mexico . . . *montivagus* (Dalla Torre) (= *unifasciculatus* Malloch?)

Psen (Psen) monticola (Packard)

Packard, 1867: 407—408, ♂ (*Mimesa monticola*; New Hampshire).
Dalla Torre, 1897: 354.
Fox, 1898b: 11—12, ♀—♂ (*Psen monticola;* Philadelphia, New Hampshire).
Ashmead, 1899: 225, ♀—♂.
Viereck, 1901: 342, ♀—♂ (*Psen monticola*).
Smith, 1908: 66, ♀ (*Psen monticolus*; Nebraska).
Mickel, 1918 (1917): 41, ♀ (*Psen monticola*; Nebraska).
Malloch, 1933: 14, ♀—♂ (*Psen* (*Psen*) *monticola*; New Hampshire, Philadelphia, Maryland, Virginia, District of Columbia, Pennsylvania, Alabama).
Krombein, 1951: 959 (*Psen* (*Psen*) *monticola*; New Hampshire to Georgia, Michigan, Alabama); 1958: 189 (West Virginia).

New records. — Canada (Ontario): 1 ♀, Toronto, 23 Aug., 1893; 1 ♀, Constance Bay, 20 July, 1933, G. S. Walley; 1 ♂, Dundas, 28 June, 1955, O. Peck; 1 ♀, Chatterton, 8 Aug., 1955, John C. Martin; 1 ♀, Foxboro, 27 July, 1956, John C. Martin; 1 ♀, Ottawa, 7 Sept., 1958, J. R. Vockeroth; 2 ♀ 2 ♂, Kent Bridge, 11 July, 1960, 2 ♀ 2 ♂, Dresden, 15 July, 1962, 15 ♀ 17♂, Bothwell, 7—18 July, 1962, 2♀, Rondeau Park, 17 and 18 July, 1962, 2 ♀, Guild, 14 July, 1962, 2 ♀ 1 ♂, Florence, 8—15 July, 1962, 2 ♀ 6 ♂, Shetland, 18 July, 1962, 1 ♀, Pt. Pelee, 17 July, 1962; all, as far as not mentioned otherwise, collected by S. M. Clark (CNC).

U.S.A. — North Carolina: 1 ♂, Highlands, 14 July, 1957, C. J. Durden (CNC); Georgia: 1 ♀, Satolah, Rabun Co., 2000 ft, 1 July, 1957, J. R. Vockeroth (CNC).

Some of these specimens have reddish mid and hind femora or reddish hind femora, in a few cases one specimen only of a series of females or males with normal dark brown hind femora.

Psen (Psen) erythropoda Rohwer

Rohwer, 1910: 102—103, ♀ (*Psen* (*Mimesa*) *erythropoda*; Virginia).
Malloch, 1933: 14—15, ♀ (*Psen* (*Psen*) *erythropoda*; Virginia, Maryland, Pennsylvania, North Carolina).
Krombein, 1951: 959; 1967: 396 (Indiana).

New records from U.S.A. — Georgia: 1 ♀, Pine Mountain, Rabun Co., 1400 ft, 25 May, 1957, W. R. M. Mason (CNC); Maine: 1 ♂, Dryden, 26 July, 1959, G. H. Heinrich (BM); Wisconsin: 1 ♀, West Bend, Washington Co., 13—14 Aug., 1966, H. E. Evans (MCZ).
Canada: 1 ♀, Bothwell, Ontario, 18 July, 1962, S. M. Clark (CNC).

Psen (Psen) striolatus (Cameron) (Fig. 1—4)

Cameron, 1891: 136—137, ♀ (*Mimesa striolata*; Mexico: Guerrero).
Dalla Torre, 1897: 354.
Ashmead, 1899: 255.

Supplementary description of female (type no. 21.826, BM). — Black; outer half of mandibles reddish, pedicel and following four segments of antennae reddish, tarsi and base of hind tibiae yellowish-red.

Clypeus broadly triangularly emarginate, densely punctate. Interantennal tooth laterally flattened, triangularly projecting. Vertex sparsely punctate. Tempora almost smooth, with very fine striae. Mandibles broad, indistinctly bidentate.

Scutum coarsely rugoso-punctate, antero-lateral corners punctate with narrow interstices. Scutellum punctate, interstices a few times larger than punctures, a few indistinct rugae. Propodeum not very coarsely reticulate. Mesopleura very finely punctate, interstices larger than punctures, hypo-epimeral area almost smooth. No acetabular carina. Petiole about twice as long as first tergite, rounded below, dorsally flattened, no sharp lateral ridge. Pygidial area triangular, apex bidentate, surface coriaceous, distinct punctures along margin. Also sides of last gastral segment coriaceous.

Face silvery pubescent, mostly appressed, head and thorax whitish, gaster yellowish-grey pubescent. Pygidial area with lateral row of whitish bristles.

In contradiction with Cameron's description the scutellum of the female is not distinctly striolated and the pygidial area has distinct punctures along the margin. Three males from Mexico are very similar and are considered the opposite sex of *P. striolatus*.

Description of these males. — Length about 8.5 mm. Antennal segments 3—7 below and apex of last segment below orange-brown. Foreside of fore and mid legs brown, base of hind tibiae, basitarsi and underside of following tarsal segments yellowish-brown. Tegulae and veins of wings brown, apical part of stigmata paler.

Clypeus dull with small triangular emargination. Frons finely punctate, interstices somewhat larger than punctures. Vertex sparsely finely punctate. Pronotal corners sharp but not spicate. Scutum shining, centrally coarsely rugoso-punctate, laterally and anteriorly finely punctate, interstices about as large as punctures. Scutellum sparsely punctate. Petiole with lateral depression.

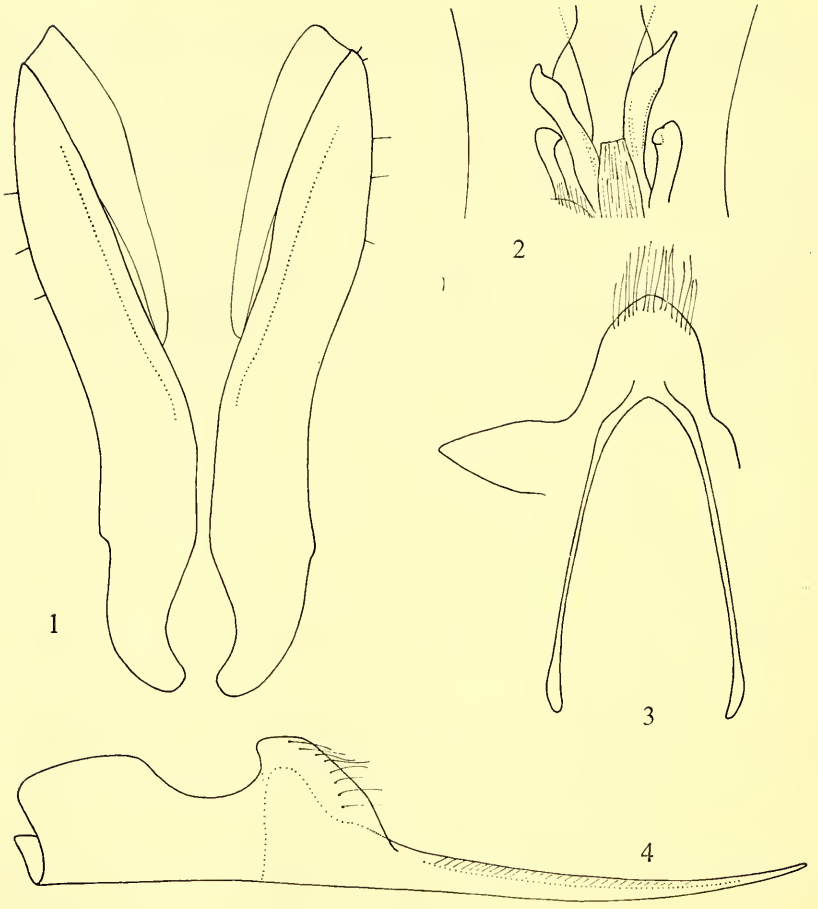


Fig. 1—4. *Psen* (*Psen*) *striolatus* (Cameron), ♂. 1, genitalia, dorsal aspect; 2, penis valves and volsellae, ventral aspect; 3, seventh sternite; 4, eighth sternite

Third antennal segment about 2½ times, segments 4—6 about twice as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, last segment about 1½ times as long as broad at base. No tyloidea.

Apical margin of sternites 3—4 with long, brown, fasciculate hairs.

Genitalia long (Fig. 1), yellowish-brown. Parameres long, sides about parallel, apex pointed, underside covered with a finely reticulate membrane, protruding as a "flag" on the inner side of the parameres and slightly depassing apex. Penis valves and volsellae, Fig. 2. Seventh sternite, Fig. 3. Eighth sternite (Fig. 4) dark brown, basal part transparent.

Mexico: Sinaloa, 3 ♂, 15 mi. W. of El Palmito, 5000 ft, 16 and 30 July, 1964, W. R. M. Mason (CNC).

Psen (Psen) irwini Bohart & Grissell

Bohart & Grissell, 1969: 221, ♀ (*Pseneo irwini*; El Savador).

New records. — Mexico: 1 ♀, Michoacan, Tuxpan, 6400 ft, 19 Sept., 1957, H. A. Scullen (OSU).

Honduras: 1 ♀, Tegucigalpa, 30 Oct., 1965, N. L. H. Kraus (USNM).

Although I have not seen the type I am convinced that the two females recorded above are identical and also that they should be placed in the subgenus *Psen*. Bohart & Grissell have given a good description and illustrations of *irwini*. They already pointed out that it displays several unique features as compared with species of *Pseneo*. The discovery of a male will undoubtedly confirm that it is a true *Psen* s.str.

The females from Mexico and Honduras have a complete acetabular carina, the upper half of the hypo-epimeral area is more or less strongly transversely striato-punctate, its lower half very sparsely punctate. Upper half of back (inner side) of femora smooth, separated from sparsely pubescent lower half by a narrow band of close fine punctures and fine short hairs. This band gradually broadens towards the apex of the femur. Petiole about 1½ times as long as first tergite, in dorsal aspect.

Psen (Psen) metallicus sp. nov. (Fig. 5—11)

Male (holotype). — Length about 8 mm. Black, tempora and mesopleura with faint bronze reflections, propodeum with slight greenish-metallic shine. Basal half of antennae including scape and legs including trochanters pale reddish-brown. Base and apex of petiole and last gastral segment reddish-brown. Mandibles yellowish-red with dark red tips. Palpi yellowish-brown. Pronotal tubercles and tegulae reddish-brown. Wings smoky, veins dark brown, stigma reddish-brown.

Frontal carina ending between antennae in a laterally flattened tooth, which in ventral view is narrowly triangular. Clypeus shining, extremely finely punctate, anterior margin triangularly emarginate, distance between lateral angles nearly ¼ of total distance there between the eyes (Fig. 5). Frons superficially punctate, vertex shining, finely punctate, interstices mostly a few times size of punctures. Postocellar area hardly raised. Tempora as broad as eyes in lateral view. Mandibles broad, apex bidentate. Antennae long and slender, third segment over 2½ times, segments 4—5 about 2¼ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about 1¾ times as long as broad at apex, last segment about 2½ times as long as broad at base.

Pronotal angles sharp. Scutum coarsely striato-punctate, anteriorly and laterally finely, indistinctly, punctate. Scutellum shining, sparsely and very finely, punctate. Metanotum dull. Enclosed area of propodeum shining with rather close, parallel, straight carinae, also medially. Back of propodeum with coarse irregular reticulation. Mesopleura including hypo-epimeral area and mesosternum shining, not perceptibly punctate. Acetabular carina very short. Legs normal. First recurrent vein of fore wings ending in second submarginal cell, second recurrent vein interstitial.

Petiole over 2½ times as long as first tergite, laterally slightly depressed. Gastral tergites and second sternite shining, very finely punctate, sternite 3 and following sternites finely aciculate.

Pubescence of face, tempora and pronotum pale golden, mostly appressed, rest of body brownish-golden. Apical margin of sternites 3 and 4 medially with long, shining, dark brown fasciculate hairs. Petiole laterally and ventrally with long, erect hairs.

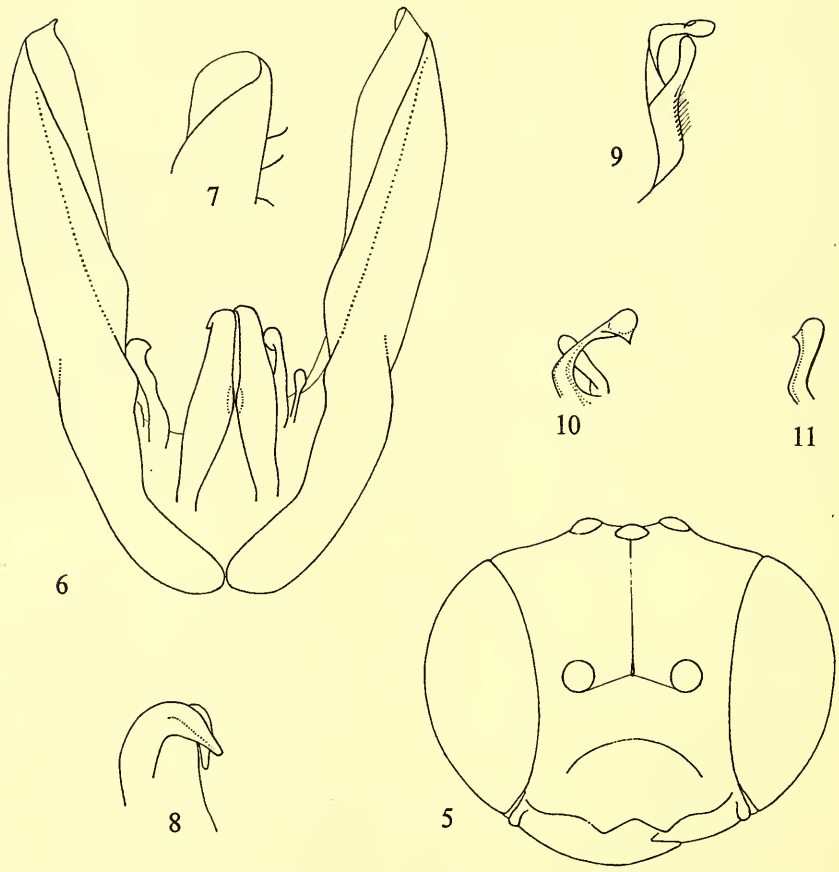


Fig. 5—11. *Psen* (*Psen*) *metallicus* sp. nov., ♂, holotype. 5, head; 6, genitalia, dorsal aspect; 7, apex (bent downwards) of left paramere, posterior aspect; 8, penis valves; 9—11, right volsella in latero-ventral, antero-dorsal and ventral aspect

Genitalia long (Fig. 6); basiparameres brown, parameres yellowish-brown. Parameres gradually narrowing towards apex, the membrane on the ventral side extending as a "flag" on the inner side of the parameres (Fig. 7). Penis valves and volsellae, Fig. 8—11.

Peru: 1 ♂, holotype, Chanchamayo, 18 Aug., 1948, D. G. Shappirio Collection 1970 (USNM).

This species resembles *P. striolatus*, e.g. as regards epicnemium, clypeal margin, parameres and sculpture of head and thorax. However, the colour, the pubescence and the length of the antennal segments are different.

Psen (Psen) barthi Viereck

Viereck, 1907: 251, ♀ (*Psen* (*Mimesa*) *barthi*; Wisconsin).
Barth, 1907: 251—257 (*Psen barthi*).
Rohwer, 1909: 324—325, ♀—♂ (*Mimesa myersiana*; Pennsylvania).
Malloch, 1933: 15, ♀—♂ (*Psen* (*Psen*) *myersiana*; Pennsylvania, Maryland).

Krombein, 1951: 959 (*Psen* (*Psen*) *barthi*; Connecticut, Pennsylvania, Maryland, Wisconsin).
Evans, 1959: 142—143.
Krombein, 1967: 396.

New records. — U.S.A.: 1 ♀, Georgia, Tennessee River, 13 July, 1957, C. J. Durden (CNC).

Canada. — Quebec: 1 ♀, Queen's Park (Aylmer), 7 July, 1925, C. E. Yauch (?); 1 ♀, Knowlton, 8 July, 1930, L. J. Milne (CNC).

The narrowly triangular pygidial area of the female, the fine punctures of the scutum, partly in rows and the relatively short petiole easily distinguish this species from its relatives. In the male only the fourth sternite shows fasciculate hairs on its apical margin.

Psen (Psen) venetus Pate

Pate, 1946: 4—6, ♀ (*Psen* (*Psen*) *venetus*; Cuba).
Dalmau, 1970: 181.

The striking bluish colour of the whole wasp is unique in this genus thus far. Pate's statement: "petiole five-sixths the length of hind femora" is misleading. The holotype was kindly sent to me for examination by the authorities of the Museum of Comparative Zoology, Cambridge, Massachusetts. Its petiole is about 1⅔ times as long as the first gastral tergite, in dorsal view, and slightly longer than the hind femora.

Psen (Psen) pulcher (Cameron)

Cameron, 1891: 135—136, ♀ (*Mimesa pulchra*; Mexico)
Dalla Torre, 1897: 354.
Ashmead, 1899: 255, ♀ (*Mimesa pulchra*).

Female. — Head and thorax black, middle part of mandibles yellowish-red, palpi testaceous. Base and apex of scape of antennae, in type also foreside of scape, antennal segments 3—4 entirely, segment 5 below and apex of last segment reddish-brown. Narrow hind margin of pronotal tubercles reddish. Legs including trochanters reddish, femora below with narrow brown mark, broader on hind femora. Tegulae reddish, wings yellowish, veins and stigma yellowish-brown, subcostal vein darker brown. Gaster including petiole black, first tergite laterally and second tergite apically somewhat dark-reddish transparent.

Fine frontal carina below median ocellus, between antennae much raised and forming a large triangular, laterally flattened tooth, not distinctly connected with antennal sclerites. Face and clypeus with dense, rather superficial punctation. Protruding median part of clypeal margin smooth, slightly triangularly emarginate, more or less bidentate. Frons densely punctate, finer below, coarser and even somewhat punctato-striate near ocelli, margin along eyes and vertex shining, finely and sparsely punctate. A deep narrow furrow behind posterior ocelli, widened at outer side of each posterior ocellus, a short narrow groove connecting posterior groove with median ocellus. Vertex before each posterior ocellus and behind ocelli slightly raised. Tempora smooth with fine hair-bearing punctures. Occipital carina ending normally in hypostomal carina. Mandibles normal, apex bidentate. Antennae gradually thickening towards apex, segment 3 about four times, segment 4 about twice, segment 5 about 1¾ times, segments 6—7 about 1½ times, segment 8 about 1¼ times as long as broad at apex, segments 9—11 about

quadrate, last segment about 1½ times as long as broad at base.

Corners of pronotum obtuse. Scutum densely striato-punctate, antero-lateral parts with finer punctures, interstices here about as large as punctures. Prescutal sutures indistinct, one quarter of length of scutum. Parapsidal sutures indistinct. Scutellum shining, punctate with interstices a few times size of punctures. Metanotum dull, indistinctly sculptured. Enclosed area of propodeum triangular, the two median longitudinal carinae close at base, diverging backwards; lateral parts with longitudinal carinae. Median longitudinal groove on back of propodeum narrow, back of propodeum and posterior half of sides dull, with irregular reticulate carination, anterior half of sides shining, a few fine punctures on their upper part. Metapleura shining; mesopleura and mesosternum shining, sparsely punctate, hypo-epimeral area densely punctate, its upper part somewhat rugoso-punctate. Anterior plate of mesepisternum with superficial sculpture. Anterior oblique suture foveolate, widened upper part with five or six oblique carinae. Lateral epicnemial carinae ventrally somewhat curved backward, connected with acetabular carina which is complete. Mesosternum with median longitudinal carina. Metasternum deeply triangularly emarginate. Mid tibiae flattened at apex, this part margined behind by three stout reddish thorns, upper two-thirds of back of hind femora smooth and shining, separated from pubescent lower part by a narrow band of fine punctures; base of hind tibiae with small elongate smooth area, defined by small reddish thorns, rest of hind tibiae with dorsal longitudinal row of stouter reddish thorns, apex with five reddish spines. First recurrent vein of fore wings ending about middle of second submarginal cell, second recurrent vein near apex. Petiole longer than first and second tergites together, cylindrical, dorsally rounded with lateral row of extremely fine punctures, sides slightly flattened with indistinct upper and lower carinae. Gaster finely sparsely punctate, apical margin of tergites 3—5 smooth, impunctate. Pygidial area narrowly triangular with sharp lateral carina, apex slightly emarginate, surface smooth, apex somewhat aciculate, distinct median longitudinal carina, a few punctures along lateral carinae.

Head golden pubescent, dense and mostly appressed on face below antennae, sparse on vertex. Dorsal side of pronotum and hind margin of pronotal tubercles with dense, short, golden pubescence. Rest of thorax with longer golden pubescence, densest on propodeum and mesosternum. Legs golden-brown pubescent, base and apex of hind tibiae golden velvety. Gaster sparsely golden-brown pubescent, last segment with some long stiff hairs. Petiole laterally and ventrally with obliquely downwards directed long hairs.

Male unknown.

New record. — Mexico: 1 ♀, Oaxaca, Vista Hermosa, 96.5 km SW. of Tuxtepec (San Juan Bautista Tuxtepec?), 1450 m, 19 Oct., 1962, coll. H. and M. Townes (HT).

The length of this female, the gaster of which is somewhat extracted, is about 12.5 mm, excluding the sting. Cameron mentions a length of 10 mm which seems to be incorrect, as head plus thorax of the holotype have a length of about 4.5 mm, as in the female from Oaxaca. Unfortunately gaster and petiole of the type are missing. It is, therefore, also impossible to check Cameron's statement that the petiole is furrowed deeply above. He must have intended to say that the sides of the petiole are furrowed.

P.pulcher is easily recognized by the red legs and the golden pubescence of the face. *P. erythrocnemus* of Brazil has also largely reddish legs and a golden face.

Psen (Psen) montivagus Dalla Torre

Cameron, 1891: 137—138, ♀ (*Mimesa monticola*; Mexico: Guerrero).
Dalla Torre, 1897: 354 (*Mimesa montivaga* new name).
Ashmead, 1899: 255, ♀ (*Mimesa Cameroni* new name for *monticola* Cam. nec Packard)
? Malloch, 1933: 15—16, ♂ (*Psen* (*Psen*) *unifasciculatus*; New Mexico).
? Krombein, 1951: 959, ♂ (*Psen* (*Psen*) *unifasciculatus*).

A study of the holotype (No. 21.823, BM) resulted in the following notes.

Female. — Black, including antennae. Base of fore and mid tibiae, basal third of hind tibiae, and fore and mid tarsi reddish-brown.

Median part of clypeal margin much protruding, distance between apical teeth nearly 1/8 of total distance there between the eyes, margin broad and shining, triangularly emarginate. Vertex rather strongly punctate, wide interstices, postocellar area slightly raised. Scutum coarsely rugoso-punctate, finer in anterior lateral corners. Scutellum shining, punctures large, interstices larger than diameter of punctures, on fore part often a few times diameter of punctures, posterior third with longitudinal rugae. Mesopleura somewhat stronger punctate than vertex, interstices larger than punctures, in upper posterior corners below hypo-epimeral area somewhat striato-punctate. Distinct acetabular carina. Propodeum not very coarsely reticulato-carinate. Petiole slightly over twice as long as first tergite, rounded below, upper and lateral sides somewhat flattened.

Pubescence of face, tempora and pronotum silvery, mostly appressed, of rest of body whitish below, yellowish-grey on upper side of head and thorax.

New records. — Mexico: 1 ♀, Vera Cruz, La Joya, 15 mi. W. Jalapa, 7 Aug., 1960, H. F. Howden (CNC); 1 ♀, Oaxaca, 85.5 km SW. of Tuxtepec, 900 m, 18 Oct., 1962, H. and M. Townes (OSU, GRF 1972).

The pygidial area of these females is narrowly triangular, shining, apex slightly coriaceous with short median carina, a few large punctures, each with long bristle along the margin. Length 8—9 mm. The pygidial area of the type is not well visible but seems to be similar.

Psen (Psen) unifasciculatus Malloch

Malloch, 1933: 15—16, ♂ (*Psen* (*Psen*) *unifasciculatus*; New Mexico).
Krombein, 1951: 959.

Judging from Malloch's description the male of *P. unifasciculatus* probably is the opposite sex of *monticola* Cameron of which the male is still unknown. In my key it runs to *montivagus* (*monticola* Cameron). More material is required to solve this problem.

Psen (Psen) paranaensis sp. nov. (Fig. 12, 13)

Female. — Length about 9 mm. Head and thorax black, labrum reddish, greater part of mandibles reddish-brown, palpi brown. Antennae black, third segment except apex brown, underside of following two segments brownish tinged. Hind margin of pronotal tubercles dark brownish, tegulae reddish-brown. Wings slightly smoky, veins brown, stigma yellowish-brown. Trochanters partly brown, dorsal side of femora and entire tibiae and tarsi reddish-brown. Petiole and gaster black, apical margin of tergites and of sternites 1—5 brownish transparent.

Fine frontal carina, below median ocellus almost absorbed by sculpture, ending between antennae in a low pyramidal tooth which is connected with antennal sclerites by a fine carina. Face below antennae with dense superficial punctation, supra-clypeal area with shallow broad-oval depression. Protruding median part of clypeal margin smooth, slightly emarginate, bidentate (Fig. 12). Frons below median ocellus coarsely densely punctato-striate, vertex and broad margin along eyes almost impunctate, shining. A deep narrow suture behind posterior ocelli, widened on outer side of ocelli, a short narrow longitudinal suture connecting posterior transverse suture with median ocellus. Postocellar area distinctly raised. Tempora shining, impunctate, in lateral view slightly broader than eyes. Occipital carina ending normally in hypostomal carina. Mandibles normal. Third antennal segment nearly three times, segment 4 nearly 1¾ times, segments 5—6 about 1½ times, segments 7—8 about 1¼ times as long as broad at apex, segments 9—11 nearly quadrate, last segment about 1¾ times as long as broad at base.

Pronotal corners rectangular. Scutum densely striato-punctate, prescutal sutures short, ¼ of length of scutum, parapsidal sutures distinct, shallow. Antero-lateral parts of scutellum shining with large interstices between punctures, rest of scutellum coarsely punctate, posterior ⅔ with distinct longitudinal rugae. Metanotum dull, finely transversely rugose. Enclosed area of propodeum triangular, shining, with oblique carinae which are irregular on outer side. Back of propodeum coarsely reticulato-carinate, median longitudinal groove narrow. Greater part of sides of propodeum finely sculptured, anterior margin smooth. Metapleura smooth. Mesopleura scarcely finely punctate, very short longitudinal rugae against posterior margin. Upper half of hypo-epimeral area striato-punctate, lower half almost impunctate. Anterior plate of mesepisternum obliquely striate. Anterior oblique suture foveolate, widened upper part with oblique carinae. Outer epicnemial carinae not bent backwards, continuing into acetabular carina, which is complete. Mesosternum finely densely punctate, with distinct median longitudinal carina. Metasternum with deep triangular emargination. Apical 2/5 of median tibiae flattened on outer side, margined behind by a row of six reddish thorns, base of hind tibiae somewhat flattened, this part margined by two rows of small dark-red thorns which continue into posterior row of dark reddish thorns, apical margin with four short reddish spines. First recurrent vein of fore wings ending near middle of base of second submarginal cell, second recurrent vein ending near end of second submarginal cell. Petiole nearly twice as long as first gastral tergite, seven to eight times as long as broad in the middle (dorsal aspect), laterally flattened, hardly depressed, dorsally round and smooth with lateral row of almost imperceptible punctures, ventrally rounded and smooth, with lateral row of punctures, each with a fine long hair. Gastral tergites 1—5 smooth, densely, very finely, punctate, apical margin of fifth tergite rather broadly impunctate. Pygidial area narrow with almost blunt apex and margined by a distinct carina, surface shining, apical ⅓ finely aciculate and with a few distinct hair-bearing punctures along the sides. Greater part of second sternite shining, following sternites very finely aciculate and sparsely finely punctate.

Face, and pronotum dorsally, with appressed golden pubescence. Head, scutum and back of propodeum golden-brown pubescent, lateral and ventral sides of thorax yellowish-grey. Petiole ventro-laterally with long obliquely downwards directed greyish hairs, ventral plate laterally with a pubescent patch. Femora below with long yellowish-grey hairs, pubescence on rest of legs shorter, upper ⅔ of back of hind femora smooth, lower part normally pubescent, separated from upper part by a narrow longitudinal

band of fine punctures. Gastral tergites densely golden-brown pubescent. Margins of sternites 2—5 with a few long stiff hairs.

Male. — Similar. Length nearly 8 mm. Antennae black. Tibiae and tarsi dark brown. Central area of stigma paler than veins of wings.

Clypeal margin less protruding, emarginate, distance between apices of teeth less than ¼ of total distance there between the eyes. Tempora in lateral view slightly narrower than eyes. Face less broad, postocellar area raised as in female. Third antennal segment over 2½ times, segment 4 over 1½ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about quadrate, last segment about 1¾ times as long as broad at base; no tyloidea. Propodeum more coarsely reticulate. Petiole longer, twice as long as first tergite, sides slightly depressed. Tibiae without conspicuous thorns. Apex of seventh sternite lanceolate, with long yellowish-golden hairs. Genitalia (Fig. 13) long, yellowish-brown, apex with a few short hairs, underside with longer hairs. Pubescence of face more or less pale golden.

Brazil: 1 ♀, holotype, Paraná, Ponta Grossa, 22 April, 1970. O. W. Richards (BM); 1 ♀, paratype, Paraná, Prudentópolis, 23—25 Febr., 1969, C. Porter and A. Garcia, 1 ♀, paratype, Santa Catarina, Nova Teutonia, Dec., 1966, F. Plaumann (MCZ); 1 ♂, allotype, Nova Teutonia, 27°11′ S., 52°23′ W., 29 Nov., 1937, Fritz Plaumann (ML), 2 ♂, paratypes, Nova Teutonia, Nov., 1937 and 21 Aug., 1944, Fritz Plaumann (BM), 1 ♂, Nova Teutonia, 12 March, 1952, Fritz Plaumann (OSU, GRF 1972).

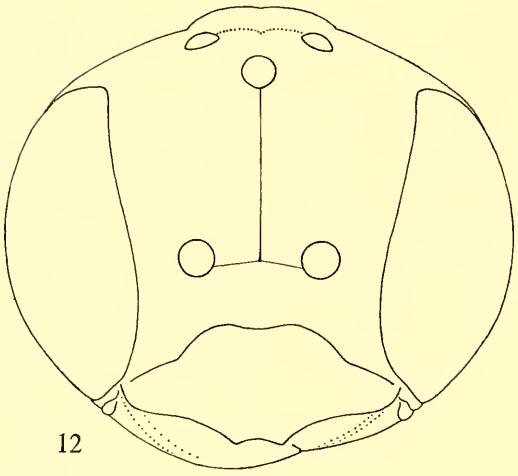
Resembling *P. pulcher* from Mexico and certainly closely related. Differs in the darker antennae and legs, the raised vertex, the striate scutellum and the much smaller interantennal tooth; its gaster is much more pubescent.

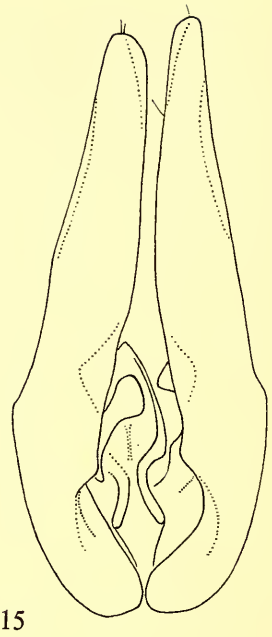
Psen (Psen) erythrocnemus sp. nov. (Fig. 14, 15)

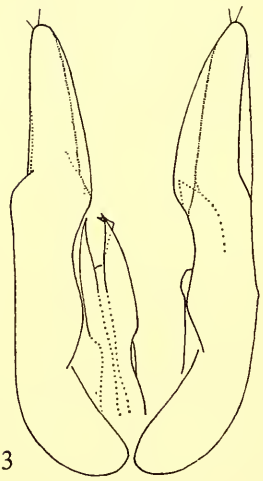
Female. — Length about 10.5 mm. Head black; antennal segments 3—5 brown below, labrum and central part of mandibles reddish-brown, palpi yellowish-brown. Thorax black, propodeum with brassy shine, tegulae brown. Gaster black. Femora, tibiae and tarsi reddish-brown, femora often partly, rarely entirely, darker brown. Hind margin of gastral tergites and sternites somewhat transparent brownish. Wings somewhat smoky, veins brown, stigma much paler.

Frontal carina ending between antennae in a pyramid-shaped tooth. Clypeus convex, apical margin broad, dull, triangularly emarginate, bidentate. Surface of clypeal disk superficially coriaceous, frons densely coarsely punctate, vertex sparsely, much finer, punctate, very widespread between oculi and ocelli. Postocellar area distinctly raised. Tempora almost smooth. Scape of antennae about three times as long as broad at apex, segment 3 about 3½ times, segment 4 about twice, segment 5 about 1¾ times, segments 6—7 about 1½ times, segment 8 about 1¼ times. Segments 9—11 almost quadrate, last segment about 1½ times as long as broad at base.

Pronotal angles nearly rectangular. Scutum densely striato-punctate, anteriorly and laterally finer punctate, no distinct rugae. Scutellum shining, densely punctate. Metanotum with superficial sculpture. Prescutal sutures indistinct. Enclosed area of propodeum triangular, with oblique lateral carinae, back of propodeum coarsely reticulate. Mesopleura including hypo-epimeral area, and mesosternum, finely punctate, interstices larger than punctures. Anterior oblique suture foveolate, upper part widened







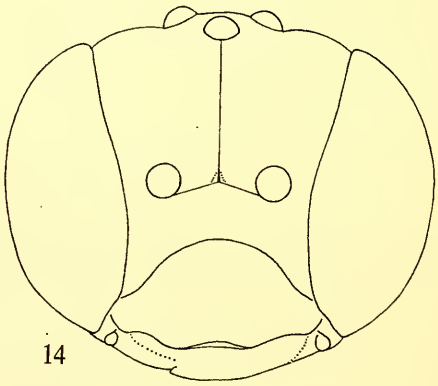


Fig. 12—13. *Psen* (*Psen*) *paranaensis* sp. nov. 12, head of female, holotype; 13, genitalia of male, allotype, dorsal aspect. Fig. 14—15. *Psen* (*Psen*) *erythrocnemus* sp. nov., ♂. 14, head; 15, genitalia, dorsal aspect

with transverse carinae. Lateral epicnemial carinae curved backwards, confluent with acetabular carina, which is complete. Legs normal. Both recurrent veins end in second submarginal cell. Petiole twice as long as first tergite, quadrate in transverse section, sides with indistinct groove. Gaster finely punctate. Pygidial area narrowly triangular, with high lateral carinae and a few large, hair-bearing punctures along the sides. Surface smooth, apical part coriaceous, a low median longitudinal carina, broadening and fading out towards base.

Pubescence of face and tempora golden, mostly appressed, frons golden, vertex

brownish-golden, scutum and scutellum dark brown, metanotum, propodeum, mesopleura, mesosternum and gaster golden-brown pubescent. Petiole laterally and ventrally with sparse, long, erect hairs, a latero-dorsal row of long and partly very short hairs.

Male. — Similar. Length 9—10 mm. Black. Base of antennae somewhat paler than in female. Apex of last gastral segment reddish. Clypeus with weak triangular emargination (Fig. 14). Tempora distinctly narrower than eyes in lateral view. Scape of antennae about twice as long as broad at apex, segment 3 about 3½ times, segment 4 about 2½ times, segments 5—7 over twice, segments 8—12 about twice as long as broad at apex, segment 13 over 2½ times as long as broad at base. No tyloidea.

Sculpture of dorsal side of thorax somewhat coarser, scutellum and metanotum rugoso-punctate. Legs slender. Petiole over twice as long as first tergite. Apical spine long.

Genitalia (Fig. 15) yellowish-brown or reddish-brown, long, sides of parameres almost parallel, apex rounded and with long hairs below. Fourth gastral sternite with fringe of dark golden fasciculate hairs (in one specimen also on one side of median part of third sternite a small tuft of fasciculate hairs).

Brazil: 1 ♀, holotype, Serra do Caraca, S. Barbara, Minas Gerais, 1600 m, April, 1969, F. M. Oliveira, 1 ♀, paratype, Margaratiba, Muriqui, Rio de Janeiro, July, 1969, M. Alvarenga (HT); 12 ♂, allotype and paratypes, Serra da Bocâina, S. J. Barreiros, Sao Paulo, 13—17 Jan., 1969, Porter and Garcia, 1 ♂, paratype, Nova Teutonia, Santa Catarina, Febr., 1966, Fritz Plaumann (MCZ).

P. erythrocnemus seems to be closely related to *P. pulcher* (Cameron), of which the male is still unknown. It differs from *pulcher* in the pyramid-shaped interantennal tooth and the darker legs. The wings are not yellowish, as in *pulcher,* but somewhat smoky. The male is characterized by the narrow tempora, the long antennal segments and the absence of fasciculate hairs on the third sternite. I expect that the difference in the width of the tempora is a sexual dimorphism only, although this was not yet noticed in other neotropical *Psen.*

Subgenus **Pseneo** Malloch, 1933

In the Neotropical region the subgenus *Pseneo* seems to comprise more species than the other Psenine genera or subgenera, with the exception perhaps of the genus *Pluto* Pate, 1937. Eighteen American forms of *Pseneo* can be distinguished at the moment, of which eleven on the South American continent, five in Central America and five north of Mexico. The South American species of *Pseneo* have a very uniform appearance. The pronotal angles are always more or less pointed, spicate or lobular, which is also found in some Neotropical species of *Psen* s.str. and *Pluto.* The scutum is always coarsely sculptured, very densely punctate or rugoso-punctate, often with distinct shining longitudinal rugae. These rugae may be long and straight or short and irregular and seem to be very constant in the various species.

Krombein (1950) paid already attention to the male genitalia of *Pseneo.* They may offer good characteristics to distinguish the species. Therefore I made drawings of these parts of as many species as possible, including a number of Nearctic species. In accordance with Snodgrass (1941) and Richards (1956) the terms basiparamere and paramere (stipes and squama, Van Lith, 1965) have been used in the present paper. These two parts are fused together and usually form an angle, in lateral view (Fig. 22).

The apices of the parameres are best compared when examined from above or somewhat from aside, in such a position that their greatest width is exposed. Examination may be hampered when the parameres are thin and curl when dried, as often occurs in *P. longiventris*.

Morphology

The Neotropical species of *Pseneo* have a number of characteristics in common. These are enumerated below and will not be repeated in the descriptions of the species.

Median part of anterior margin of clypeus narrowly raised, emarginate, and except in *P. eliasi,* tridentate in anterior view, at least lateral teeth continuing as a carina on ventral side of clypeus which is relatively broad. Disk of clypeus densely superficially punctate. Fine frontal carina ending between antennae in a low tubercle or tooth, connected by a fine carina with the antennal sclerites. A rectangular groove behind and on outer sides of posterior ocelli, sometimes a median longitudinal groove between posterior ocelli. On frons against oculi a small and raised, impunctate or almost impunctate area. High occipital carina, ending in hypostomal carina. Mandibles rather broad, apex bidentate.

Anterior oblique suture with large alveolae, widened upper part with transverse carinae. Prescutal sutures indistinct because of sculpture of scutum. Metanotum dull, rugose. Enclosed area of propodeum triangular, lateral parts with oblique carinae, much concave between carinae, back of propodeum coarsely reticulato-carinate. Lateral epicnemial carinae continuing in acetabular carina. Metasternum feebly triangularly emarginate in female, in male almost straight. Petiole dorsally and ventrally smooth, in nearly all species with distinct lateral groove or depression. First tergite much convex. Gaster finely punctate. Pygidial area of female narrowly triangular, lateral carinae high; most species have also a longer or shorter median keel. Surface of pygidial area almost smooth, a row of distinct punctures along the sides; only *P. eliasi* has a very densely punctate pygidial area. Genitalia of male long, parameres narrowed towards apex. Seventh sternite of male emarginate; eighth sternite protruding as a long apical spine, bent upwards.

Both recurrent veins of fore wings ending in second submarginal cell. Hind coxae with high upper keel. Back of hind femora bare on upper half or two-thirds, near apex a depressed dull area about as long as width of femur, very densely pubescent. Mid tibiae of female with a row of slender or short reddish thorns on outer side of apical part, hind tibiae with row of stouter thorns on outer side. Hind tibiae of male with a few much weaker thorns only.

Pubescence of face and pronotum mostly appressed, also a few long erect hairs.

Key to the species of the subgenus *Pseneo*

(Males of *auriventris* and *magnificus* and females of *canalicus* and *funicularius* unknown)

1. Pronotal angles, at least of female, not or little produced, rectangular in frontal view and mesopleura distinctly or coarsely punctate or rugoso-punctate. If pronotal angles of male spicate, then tyloidea dull and on segments 8—11 almost as long as segment. North America, *P. punctatus* also in Mexico 2

— Pronotal angles spicate, if not distinctly produced, mesopleura finely punctate and entire pubescence golden. Tyloidea of male shorter, usually shining. Mexico and

South America, *P. longiventris* also in Arizona and New Mexico 6

2. Scutum and scutellum coarsely rugoso-punctate, also mesopleura. Hypo-epimeral area strongly rugose. Vertex behind ocelli finely, not densely punctate. Pronotal angles in both sexes not spicate. Tarsi, sometimes also tibiae and petiole, reddish. Face silvery pubescent. Male with small papilliform tyloidea on segments 3—10, indistinct on 11th segment. Largely confined to Carolinian zone . . . . . *kohlii* Fox
— Scutellum mostly punctate only, at least anteriorly, with shining, smooth interstices. Mesopleura strongly punctate or striato-punctate. Antennae of male with large tyloidea 3
3. Scutum coarsely striato-punctate, in female antero-laterally most of punctures subcontiguous. Mesopleura strongly punctate, in female somewhat striato-punctate, in male coarsely rugoso-punctate, hypo-epimeral area strongly rugose. Frons rather densely deeply punctate, vertex sparsely finely punctate. Pronotal angles in both sexes not spicate. Face, pronotum and propodeum silvery pubescent, legs black or brown, tarsi orange-brown. Tyloidea on antennal segments 6—13 of male large oval, shining; smaller and less distinct on segment 5. Chiefly Carolinian zone, New Jersey to North Carolina and Canada . . . . . *simplicicornis* Fox
— Scutum of female antero-laterally with separated punctures and/or face pale golden and/or petiole and legs more or less ferruginous. Antennal segments 5—12 of male with elongate, dull and closely punctate tyloidea, almost as long as segments . 4
4. Petiole and legs black except reddish or brownish tarsi. Face silvery or pale golden. Mesopleura with separated punctures on most of disk, interstices larger than punctures. Scutum antero-laterally with most of punctures separated by about half diameter of punctures. Male with spicate angles of pronotum. Upper Sonoran zone and Mexico . . . . . *punctatus* Fox
— Legs more or less reddish. Face of female golden or pale golden. Mesopleura of male rugoso-punctate or tergites 1—2 reddish 5
5. Wings feebly yellowish. Petiole often dark reddish. At least tibiae and tarsi reddish. Mesopleura of female with separated irregular punctures on most of disk, interstices of same size or smaller, in male mesopleura rugoso-punctate. Chiefly in Austro-riparian zone, north to district of Columbia . . . . . *carolina* Rohwer
— Wings strongly yellowish. Legs, propodeum in part, petiole and tergites 1—2 reddish, mesopleura in both sexes rugoso-punctate. Tropical zone southern Florida . . . . . *ferrugineus* (Viereck)
6. Pygidial area of female with distinct median longitudinal carina, at least on apical half. Scutum with longitudinal rugae, if scutum densely rugoso-punctate stigma of fore wings yellowish-brown and legs reddish. Vertex sparsely or densely punctate, but shining interstices behind ocelli . . . . group of *longiventris* (Cameron) 7
— Pygidial area of female without distinct median carina or densely punctate there. Scutum densely coarsely punctate, no distinct longitudinal rugae, at least not on anterior half. Scutellum coarsely rugoso-punctate, sometimes with shining interstices. Vertex densely striato-punctate, no distinct shining interstices, a small smooth area on outer side of posterior ocelli . . . . . group of *argentinus* (Brèthes) 15
7. Scutum with shining and relatively broad rugae, mostly as long as scutum. Scutellum shining with longitudinal rugae. Postocellar area usually finely sparsely punctate. Mesopleura finely sparsely punctate, hypo-epimeral area at most weakly sculptured. Scape and legs black, often tarsi and foreside of fore tibiae reddish-brown.

Pubescence of clypeus and frons silvery or pale golden, of pronotum pale golden, of scutellum, metanotum and gaster from yellowish-grey to brownish, of propodeum pale golden. Mesopleura and mesosternum whitish pubescent. Stigma dark. Tyloidea of male short and narrow on segments 3—6, small, round and shining on segments 7—10, indistinct or absent on 11th segment. Arizona, New Mexico, Mexico, British Honduras (now Belize), Guatemala, El Salvador, Costa Rica, Panama Canal Zone, Trinidad, Colombia, Surinam . . . . . *longiventris* (Cameron)

— Scutum with shorter, less strong and straight, more irregular or indistinct rugae. Scape sometimes reddish. Hypo-epimeral area usually with irregular rugae and/or vertex strongly punctate or stigma yellowish-brown 8

8. Face silvery. Pronotum dorsally pale golden. Vertex finely punctate. Hypo-epimeral area with lower half smooth, upper part weakly sculptured. Stigma yellowish-brown. Male unknown. Panama Canal Zone . . . . . *canalicus* sp.nov.

— Face golden or pale golden, if silvery, stigma black or dark brown. Vertex more strongly and more densely punctate. Hypo-epimeral area usually with irregular rugae 9

9. Pronotal angles not strongly spicate. Petiole in both sexes with rounded or flattened sides, no distinct carina or groove. In female base of antennae including scape, mandibles, legs including trochanters and petiole reddish, stigma of fore wings pale yellowish-brown. Head, thorax except enclosed area of propodeum and gaster densely golden pubescent, unusually densely on propodeum. Vertex distinctly punctate, interstices a few times larger than punctures. Scutum with distinct but incomplete rugae. Anterior half of scutellum not rugose, shining interstices between punctures. Mesopleura finely punctate. Male: petiole, trochanters and greater part of femora dark. Small tyloides on 6th antennal segment, shining small oval tyloidea on segments 7—9. Peru, Brazil (Mato Grosso) . . . . . *auriger* sp. nov.

— Pronotal angles strongly spicate. Petiole laterally flattened or with distinct groove 10

10. Stigma of forewings yellowish-brown. Scutum densely punctate with tendency to longitudinal striation. Anterior half of scutellum punctate with large interstices, posterior half rugoso-punctate. Mesopleura finely punctate, in male on upper part also some fine striation. Hypo-epimeral area with coarse rugae. Vertex densely punctate. Scape black, tibiae, tarsi, upper side and foreside of femora reddish. Pubescence of face and pronotum pale golden, vertex and scutum golden-brown, remainder of thorax including mesosternum, gaster and legs pale golden pubescent. Antennal segments 4—6 of male with narrow oblong, segments 7—10 with shining black, oval tyloidea, 11th segment with small or indistinct tyloides. Brazil . . . . . *aurifrons* (Taschenberg)

— Stigma brown or black. Scutum except anterior and antero-lateral margins distinctly longitudinally striate or rugose 11

11. Mesopleura coarsely punctate, interstices as large as or larger than punctures, slight tendency to striation. Hypo-epimeral area with strong rugae and punctures. Scutellum entirely striato-punctate. Frons and vertex coarsely punctate with shining interstices. Face usually silvery pubescent, rarely pale golden. Mesopleura silvery pubescent, vertex and dorsal and posterior part of thorax yellowish-grey or pale golden. Antennal segments 4—11 of male with small, shining, papilliform tyloidea. Mexico . . . . . *claviventris* (Cameron)

— Mesopleura usually finely punctate. Face distinctly golden or pale golden, if clypeus of male silvery, at least frons and tempora distinctly golden or pale golden . 12

12. Mesopleura and mesosternum yellowish-grey or whitish pubescent. Femora and tibiae black or brown, at most foreside of fore and mid tibiae dark reddish-brown 13
— Mesopleura and mesosternum distinctly pale golden pubescent. Legs reddish, at least greater part of tibiae 14
13. Vertex densely, not coarsely, punctate, posteriorly transversely striate, postocellar area with shining interstices. Frons finely punctate. Fore part of scutellum punctate with smooth interstices, rarely entirely rugose. Mesopleura usually finely punctate, hypo-epimeral area either entirely rugose or on upper ⅔ or upper half only. Scape of antennae reddish, rarely dorsally blackish. Vertex and scutum brownish-golden, propodeum greyish-golden pubescent. Antennal segments 3—10 or 3—11 of male with small, shining, papilliform tyloidea. Sculpture of frons and vertex coarser than in female. Brazil, Argentina, Uruguay, Paraguay, Peru, Guyana, Venezuela . . . . . *aureolus* sp. nov.
— Scape black. Vertex hardly or not striate. Brazil, Peru, Ecuador . . . . . *aureolus* sp. nov., var. nov.
14. Tibiae reddish with black streak on outer or lower side. Mandibles largely black. Base of flagellum, especially below, reddish. Golden pubescence of normal density. Punctation of vertex and postocellar area coarse and dense. Scutum antero-laterally densely punctate. Scutellum longitudinally rugose. Tyloidea of male on antennal segments 6—10 linear, small on segment 11. Female unknown. Brazil (Santa Catarina) . . . . . *funicularius* sp. nov.
— Legs including trochanters entirely, mandibles largely and antennae including scape reddish, apical half of flagellum above brownish. Golden pubescence dense, appressed on clypeus, tempora, mesopleura and propodeum. Punctation of vertex fine, sparse between and behind ocelli. Scutum laterally and antero-laterally finely punctate with shining interstices. Scutellum punctate with large interstices. Male unknown. Brazil (Pará) . . . . . *magnificus* sp. nov.
15. Pygidial area of female densely punctate. Antennal segments 8—12 of male slightly rounded below, with hardly raised tyloidea, about half length of segments, shining black, broad oval on segments 8—11. Fore and mid tibiae and tarsi largely reddish-brown. Face and pronotum usually pale golden, scutum brownish-grey, mesopleura and mesosternum whitish. Brazil . . . . . *eliasi* sp. nov.
— Pygidial area of female with lateral row of punctures. Antennal segments 7—11 of male angular below, tyloidea papilliform and smaller. Fore and mid tibiae usually dark brown or black, or mesosternum golden pubescent 16
16. Pubescence of pronotum, face, tempora, mesosternum and gaster silvery, of vertex, scutum and propodeum yellowish-grey. Scape and following segment of antennae black, base of flagellum and apex of last segment below reddish. Legs black, tarsi somewhat brownish. Mesopleura distinctly finely punctate, upper half finely striate. Hypo-epimeral area coarsely rugose. Vertex densely punctate. Antennal segment 7—11 of male with distinct small papilliform, shining black, tyloidea, segment 5 with indistinct, segment 6 with smaller, segment 12 with indistinct tyloides. Argentina . . . . . *argentinus* (Brèthes)
— Pubescence of pronotum and face golden or pale golden 17
17. Foreside of fore and mid tibiae reddish-brown or dark brown. Scape and pedicel of antennae black or reddish, base of flagellum reddish. Pubescence of face and pronotum pale golden in female, in male face more silvery. Mesopleura and

mesosternum pale golden, often whitish or greyish, scutum, scutellum, metanotum and gaster golden-brown pubescent. Vertex densely coarsely punctate. Mesopleura usually finely punctate, posteriorly some indistinct striation, in males from Paraguay and Argentina mesopleura sometimes strongly punctate. Antennal segments 5—6 of male with small tyloidea, segments 7—11 or 7—12 with somewhat larger, oval, tyloidea. Brazil, Argentina, Paraguay, Bolivia . . . . . *taschenbergi* sp. nov.

— All tibiae and tarsi and base of flagellum reddish. Pubescence of head, thorax, gaster and legs deep golden. Mesopleura finely punctate. Male unknown. Peru . . . . . *auriventris* sp. nov.

Psen (Pseneo) simplicicornis Fox (Fig. 18)

? Fox, 1898b: 9, (*Psen Kohlii,* female variety and ♂, cf. Krombein (1950); Pennsylvania, Virginia).

Fox, 1898b: 10 (*Psen simplicicornis*, ♀ type only; Virginia, North Carolina).

Ashmead, 1899: 225 (*Psen simplicicornis*).

Viereck, 1901: 342, ♀ ♂ (*Mimesa simplicicornis*).

Malloch, 1933: 10, ♀ ♂ (*Psen* (*Pseneo*) *simplicicornis*; North Carolina, Virginia, Pennsylvania, Maryland).

Brimley, 1938: 445 (*Psen simplicicornis*).

Krombein, 1950: 284—286, ♀ ♂ (*Psen* (*Pseneo*) *simplicicornis*; U.S.A.); 1951: 959; 1967: 396.

Evans, 1959: 142 (larva).

Recorded (Krombein, 1950) from New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina.

New records. — Canada: Quebec, 2 ♀, Aylmer, 11 and 16 Aug., 1926, R. P. (CNC).

This species is very near to *P. punctatus* from which it can be distinguished by the coarser sculpture of scutum and mesopleura. Antennal segments 7—12 of male convex below, with large shining tyloidea, longer than half the length of the segments, tyloidea dull on segment 13, much smaller on segment 6 and indistinct on segment 5.

Genitalia (Fig. 18) brownish-yellow; basiparameres with angular inner shoulder, as in *P. punctatus,* parameres basally broad, abruptly narrowed towards apex, apices below with long hairs.

Psen (Pseneo) punctatus Fox (Fig. 16)

Fox, 1898b: 9—10, ♀ (*Psen punctatus*; Colorado).

Ashmead, 1899: 225, ♀ (*Psen punctatus*).

Viereck, 1901: 342, ♀ (*Mimesa punctata*).

Mickel, 1918 (1917): 361, ♀ (*Mimesa punctata*, Nebraska).

Malloch, 1933: 10—11, ♀ ♂ (*Psen* (*Pseneo*) *punctatus*; Nebraska, Colorado).

Krombein, 1950: 282—284, ♀ ♂ (*Psen* (*Pseneo*) *punctatus punctatus*; South Dakota, Nebraska, Colorado); 1951: 959.

New records. — Mexico: Morelos, Cuernavaca, 5500 ft, 2 ♀, 22 March and 9 May, 1959, 2♂, 17 May, 1959, H. E. Evans, 1♂, 3 mi. N. Alpuyeca, 3400 ft, 30 March, 1959, H. E. Evans and D. M. Anderson (CU). Length of female 13 mm.

Krombein (1950) suggested that additional collecting (in the west) might show that the ranges of this form and *P. kohlii spicatus* (*Mimesa longiventris* Cameron) overlap in part. If my identifications are correct both species have now been collected in Mexico. The area of *P. punctatus* s.str. ranges from North Dakota to Southern Mexico. I have not seen the male recorded by Viereck (1903) from New Mexico. His description of

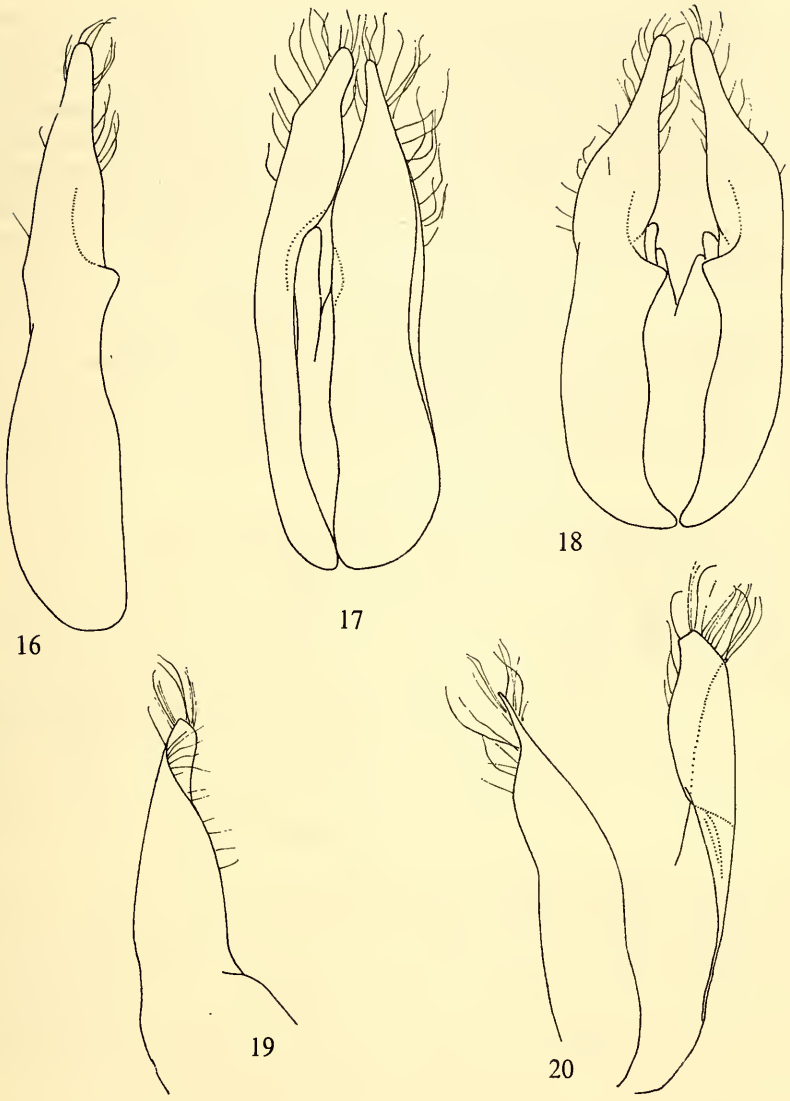


Fig. 16—18. Male genitalia of various species of *Psen* (*Pseneo*). 16, *P. punctatus* Fox, Mexico, right basiparamere and paramere; 17, *P. kohlii* Fox; 18, *P. simplicicornis* Fox. Fig. 19—20. *Psen* (*Pseneo*) *longiventris* (*Cameron*), ♂, Colombia. 19, left paramere, lateral aspect; 20, parameres in latero-dorsal aspect, apex of right paramere twisted

the antennae "joints two to eight inclusive of flagellum with a weak point beneath" does not suit that of *P. punctatus*.

P. punctatus much resembles *P. longiventris* as regards the sculpture of the disk of the scutum but on the anterior corners of the scutum the punctures are fine and separated, the scutellum is less distinctly rugose, the punctation of the mesopleura is stronger and closer — interstices between punctures being as large as or slightly larger than punctures

— and the females have no distinctly spicate pronotal angles, although in dorsal view they appear to be acute.

The males recorded above from Mexico have distinctly spicate pronotal angles. They are easily distinguished from *P. longiventris* by the dull tyloidea on segments 6—11, on segments 8—11 almost as long as the segments, and by the genitalia. The latter (Fig. 16) are yellowish-brown, parameres long, gradually narrowing towards the apex, a distinct, rounded tooth is formed by the inner shoulder of the basiparameres. According to Krombein (1950) the lateral margin of the median lobe of the seventh sternite is evenly rounded.

Psen (Pseneo) carolina Rohwer

Rohwer, 1910: 103, ♀ (*Psen* (*Mimesa*) *punctata* var. *carolina*; N. Carolina).
Malloch, 1933: 11, ♀ (*Psen* (*Pseneo*) *carolina;* N. Carolina, Virginia).
Malloch, 1933: 9—10 (*Psen* (*Pseneo*) *kohlii,* ♂ only).
Brimley, 1938: 445 (*Psen carolina*).
Krombein, 1950, 283—284, ♀ ♂ (*Psen* (*Pseneo*) *punctatus carolina,* new status; U.S.A.); 1951: 959.

This form was recorded by Krombein (1950) from District of Columbia, Virginia, North Carolina, Georgia, northern Florida, Alabama and Mississippi.

New records from U.S.A. — Georgia: 1 ♀, Carlton, Carlton Creek, 21 July, 1957, W. R. Richards (CNC); Arkansas: 1 ♀, Mount Magazine, 2800 ft, 24 Aug., 1965, H. E. and M. A. Evans (MCZ).

Both females have all tibiae and tarsi reddish, the petiole is dark reddish.

As the sculpture of the mesopleura differs from that of *P. punctatus* s.str. — punctures stronger and interstices smaller in the latter form — I consider *P. carolina* a distinct species. I have seen no males.

Psen (Pseneo) ferrugineus (Viereck)

Viereck, 1901: 341, ♂ (*Mimesa ferruginea*; South Florida).
Malloch, 1933: 9, ♂ (*Psen* (*Pseneo*) *ferrugineus*; Florida).
Krombein, 1950: 284, ♀ ♂ (*Psen* (*Pseneo*) *punctatus ferrugineus*; tropical zone in southern Florida); 1951: 959.

This form from southern Florida is easily recognized by the colour of the gaster. Because of the sculpture of the mesopleura I prefer to regard it as a distinct species.

Psen (Pseneo) kohlii Fox (Fig. 17)

? Packard, 1867: 399, ♂ (*Psen niger*; cf. Fox (1898) and Krombein (1950)).
Fox, 1898b: 9, ♀ type only (*Psen Kohlii*; Philadelphia, Virginia).
? Fox, 1898b: 10, ♂ only (*Psen simplicicornis,* cf. Krombein (1950)).
Ashmead, 1899: 225, ♀ ♂ (*Psen kohlia* (!)).
Viereck, 1901: 342, ♀ ♂ (*Mimesa kohlii*).
Rohwer, 1917 (1916): 659 (*Psen* (*Mimesa*) *kohlii*).
Malloch, 1933: 9, ♀ only (*Psen* (*Pseneo*) *kohlii*).
Malloch, 1933: 11, ♀ (*Psen* (*Pseneo*) *fulvipes*; Alabama. Cf. Krombein (1950)).
Malloch, 1933: 12, ♂ (*Psen* (*Pseneo*) *angulatus*; Virginia, Pennsylvania. Cf. Krombein (1950)).
Brimley, 1938: 445 (*Psen Kohlii*).
Krombein, 1950: 280—281, ♀ ♂ (*Psen* (*Pseneo*) *kohlii kohlii* new status: America north of Mexico); 1951: 959; 1958: 189 (West Virginia).
Krombein, 1967: 396 (*Psen* (*Pseneo*) *longiventris kohlii* new status; Indiana).

According to Krombein (1950, 1958, 1967) this species was collected in New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Alabama, Kansas, West Virginia and Indiana.

New records from U.S.A. — New York: 1 ♀, Farmingdale, 31 July, 1938, H. and M. Townes (BM); Georgia: 1 ♀, Warwoman Cr., Rabun Co., 1500 ft, 31 July, 1957, J. G. Chillcott (CNC); North Carolina: 1 ♀, Pisgah Forest, 12 Aug., 1957, W. R. Richards (CNC); South Carolina: 1 ♂, Anderson, 21 July, 1957, W. R. Richards (CNC).

The genitalia of the male differ so much from those of *P. longiventris* that it cannot be considered a subspecies of the latter.

Parameres (Fig. 17) in dorsal view with short, abruptly narrowed, apical part and rounded tip. Inner shoulder of basiparameres not tooth-like. In *P. longiventris* the parameres are gradually narrowed, their apex is blunt.

Antennal segments 3—10 of male with small papilliform tyloidea, dark and shining on segments 6—10, indistinct on segment 11.

Psen (Pseneo) longiventris (Cameron) (Fig. 19, 20)

Cameron, 1891: 137, "♀" = ♂ (*Mimesa longiventris*; Mexico: Atoyac in Vera Cruz).
Cameron, 1891: 138, ♀ (*Mimesa montezuma*; Mexico: Atoyac in Vera Cruz).
Dalla Torre, 1897: 354 (*Mimesa longiventris*).
Dalla Torre, 1897: 354 (*Mimesa montezuma*).
Ashmead, 1899: 225, ♀ (*Mimesa longiventris*).
Ashmead, 1899: 225, ♀ (*Mimesa Montezuma*).
Malloch, 1933: 12, ♂ (*Psen* (*Pseneo*) *spicatus*; New Mexico).
Krombein, 1950: 282, ♂ (*Psen* (*Pseneo*) *kohlii spicatus* n. status).
Krombein, 1951: 959, ♂ (*Psen* (*Pseneo*) *kohlii spicatus*).
Krombein, 1967: 396, ♂ (*Psen* (*Pseneo*) *longiventris longiventris* n.status and n. comb.).

Female. — Length 9—11 mm. Black; base of flagellum and last segments below reddish, central part of mandibles dark red, palpi yellowish-brown, tegulae reddish-brown, veins of wings brown, foreside of fore tibiae and all tarsi reddish-brown, rarely legs entirely black (El Salvador). Tibial spurs of fore legs yellowish-white, of mid and hind legs whitish.

Frons mostly densely and distinctly, but finely, punctate, between ocelli and oculi and on vertex more sparsely, interstices behind ocelli many times size of punctures. Tempora shining, finely punctate. Scape of antennae about 2½ times, segment 3 about four times, segments 4—6 about twice, segment 7 about 1½ times, segment 8 about 1¼ times as long as broad at apex, segments 9—11 about quadrate, last segment about 1 ½ times as long as broad at base.

Pronotum narrow, angles strongly spicate. Scutum with strong broad rugae which have mostly length of scutum and punctures between, sides of scutum punctate only, interstices often larger than punctures. Scutellum longitudinally rugoso-punctate, rugae weaker than on scutum. Mesopleura and mesosternum finely sparsely punctate, hypo-epimeral area shining, upper third somewhat rugoso-punctate. Anterior plate of mesepisternum weakly sculptured, shining. Petiole about twice as long as first tergite, laterally with distinct longitudinal groove. Pygidial area with median longitudinal keel which is high and distinct on apical third, low on rest of pygidial area.

Pubescence of face pale golden, sometimes almost silvery, especially in females from Mexico, tempora short and silvery, vertex yellowish-grey in females from Mexico, brownish-golden in southern specimens, pronotum dorsally pale golden, scutum and scutellum more or less brownish, metanotum and propodeum pale golden, mesopleura and mesosternum whitish, legs and gaster pale golden or yellowish-grey pubescent. Petiole ventrally with long erect hairs, also a few on sides, latero-dorsally a row of short hairs.

Male. — Similar. Length 7—9 mm. Scape of antennae and segment 3 about twice, segments 4—6 about 1¼ times as long as broad at apex, segments 7—8 gradually decreasing in length, segments 9—12 about quadrate, segment 13 about 1½ times as long as broad at base. Segments 3—6 with small narrow tyloidea, tyloidea on segments 7—10 small, shining, papilliform, on segment 11 indistinct or absent. Segments 4—10 slightly rounded below. Punctation of vertex and mesopleura often stronger than in female.

Genitalia (Fig. 19—20) brownish-yellow, parameres broad and thin, twisted in dry state, apical part below with long hairs.

New records. — U.S.A.: 1 ♂, Arizona, 5 mi. N. Phoenix, 7 July, 1962, R. F. Sternitzky (CNC).

Mexico: 1 ♀, "Cordova F. Sm. Coll. 79.22" (Vera Cruz?) (BM); 3 ♀, San Luis Potosi, El Naranjo, about 24 km W. Nuevo Morelos, 9 Oct., 1962, H. and M. Townes (OSU, GRF 1972), 1 ♀, nr. El Naranjo, about 64 km W. Nuevo Morelos, oak forest, 8 Oct., 1962, H. & M. Townes (OSU, GRF 1972); 1 ♀, Sinaloa State, 13 mi. E. Concordia, 1500 ft, 9 Aug., 1964, W. R. M. Mason (CNC).

British Honduras (now Belize): 10 ♀, Middlesex, 125 m, 15 March—25 April, 1964, E. C. Welling (CNC).

Guatemala: 2 ♀ 2 ♂, Mocá, Guatalon, 1000 m, March—April, 1931, J. Bequaert (MCZ).

El Salvador: 1 ♀, Santa Tecla, 638 m, 28 June, 1974, C. G. Dean (BM).

Costa Rica: Turrialba, 1 ♀ 1 ♂, "V.21", Heyne (ZMB), 1 ♀, 1—6 March, 1965, S. S. and W. D. Duckworth, 1 ♀, 15—19 July, 1965, P. J. Spangler (USNM); 6 mi. W. Turrialba, 1 ♂, 13 July, 1963, 4000 ft and 1 ♂, 17 July, 1963, 3800 ft, Scullen and Bolinger (OSU); 1 ♂, Cartago Turrialba, 646 m, 13 Sept., 1964, M. G. Naumann (SEM); San José, 1 ♀, "1.1", H. Schmidt (ZMB); 1 ♀, No. 428, Weyrauch coll. (IML); 1 ♀, 9 mi. NW. Esparta, 22 July, 1965, Paul J. Spangler (USNM); 1 ♀, Alajuela Prov., 5 mi. N. Quesada, 750 ft, 20 Febr., 1964, H. Evans (MCZ); 2 ♀ 1 ♂, Pandora, 19 July, 1966, C. R. Baltazar (CRB).

Panama Canal Zone: 1 ♀, Corozal, 21 Jan., 1929, C. H. Curran; 1 ♀, Barro Colorado I., 28 Jan., 1929, C. H. Curran (AMNH).

Colombia: 1 ♀, Dept. Boyaca, Muzo, 900 m, June, 1936, J. Bequaert (MCZ); 1 ♀, Buenaventura, Llano Bajo, 100 m, 3 Oct., 1971, M. Cooper; 1 ♀ Llano Bajo nr. Buenaventura, 28 July, 1974, M. Cooper; 1 ♂, Cauca, Popayan, 1800 m, 10—12 Nov., 1971, M. Cooper; 2 ♀, Sierra Nevada, Magd. Minca, SE. of Santa Marta, 1000 m, 26 Febr., 1974, M. Cooper (BM).

Surinam: 1 ♀, Paramaribo, 11 Jan., 1958, P. H. van Doesburg Jr. (PMFV).

Trinidad: 1 ♀, Caiman Valley, 31 Jan., 1961 (CNC).

P. longiventris is characterized by the rugae on the scutum which are stronger and more regular than in any other form and by the sparse punctation of the vertex, in the

male also by the apices of the genitalia. The specimens from Mexico are paler pubescent than the rest of the material.

Cameron (1891) mistook the male type for a female, whilst his *Mimesa montezuma,* from the same locality, is undoubtedly the true female of *P. longiventris*. The clypeal margin of this female is normally emarginate and tridentate. Cameron wrote: "this part being semicircular". He did not mention the structure of the pygidial area; this is the same as in the fresh material recorded above.

Psen (Pseneo) canalicus sp. nov.

Female (holotype). — Very similar to *P. longiventris*. Length about 10 mm. Not only base of flagellum but also scape and pedicel reddish. Tegulae very dark brown. Veins brown, stigma of fore wings much paler. Tarsi except bases of basitarsi orange-brown.

Clypeus, frons and tempora silvery, vertex brownish, pronotum pale golden, scutum, scutellum and metanotum dark brown, propodeum pale golden, mesosternum whitish pubescent.

Scape of antennae about 2½ times, segment 3 nearly four times, segment 4 over twice, segment 5 nearly twice, segment 6 about 1½ times, segments 7—9 about 1¼ times as long as broad at apex, segments 10—11 about quadrate, last segment about 1½ times as long as broad at base.

Longitudinal rugae of scutum less strong and more irregular, punctures in anterior corners of scutum separated. Anterior half of scutellum sparsely punctate, posterior half rugoso-punctate. Mesopleura and mesosternum superficially sparsely punctate. Lower half of hypo-epimeral area smooth, upper part weakly sculptured. Sides of petiole with groove.

Easily distinguished from *P. longiventris* by the sculpture of the scutum and the colour of face, scape, stigma and tarsi.

Male unknown.

Panama Canal Zone: 1 ♀, holotype, Barro Colorado Island, July, 1967, W. W. Wirth (USNM).

Psen (Pseneo) auriger sp. nov. (Fig. 21—26)

Female (holotype). — Length 10—13 mm. Black; following parts reddish: basal half of antennae including scape, mandibles except dark apices, labrum, tegulae, legs including trochanters. Palpi yellowish-brown. Pronotal tubercles brownish. Petiole, including ventral plate reddish-brown. Veins of wings brown, stigma yellowish-brown, upper half of radial cell slightly fuscated.

Frons densely finely punctate. Vertex finely punctate, between ocelli and oculi interstices at least as large as punctures; interstices behind ocelli a few times size of punctures, no distinct transverse striae. Tempora not perceptibly punctate. Scape of antennae about twice, segment 4 over four times, segments 4—6 about twice, segment 7 about 1½ times as long as broad at apex, following segments gradually decreasing in length, segment 11 quadrate, segment 12 nearly twice as long as broad at base.

Pronotal angles not always distinctly spicate. Scutum densely coarsely, somewhat longitudinally rugoso-punctate, antero-lateral corners much more finely, densely punctate. Posterior half of scutellum striato-punctate, anterior half with large shining interstices. Mesopleura shining, with hardly perceptible hairbearing punctures; hypo-epimeral area with coarse oblique rugae. Mesosternum finely punctate. Petiole over twice as long as

first tergite, almost cylindrical, no lateral carinae or groove. Pygidial area with median keel which is almost complete but ends before apex, between this keel and lateral carinae a row of large punctures.

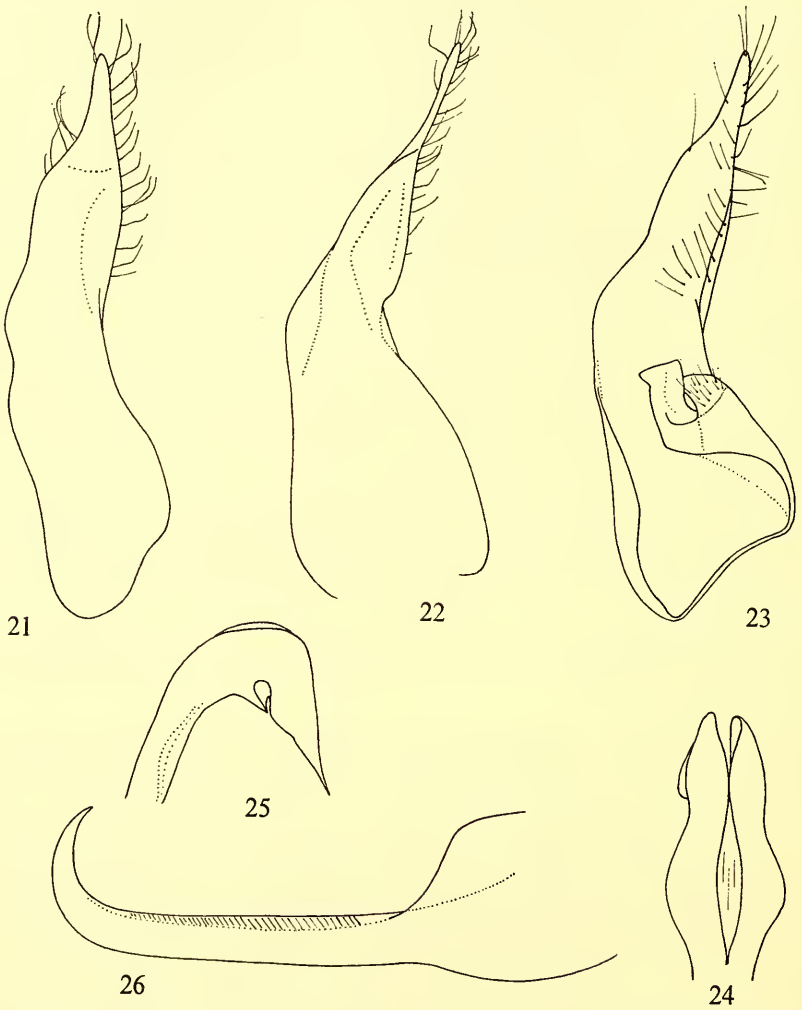


Fig. 21—26. *Psen* (*Pseneo*) *auriger* sp. nov., ♂, allotype. 21, left basiparamere and paramere, latero-dorsal aspect; 22, same, lateral aspect; 23, same, inner side; 24—25, penis valves, dorsal and lateral aspect; 26, eighth sternite, lateral aspect

Face below antennae and pronotum densely, golden pubescent. Rest of head, entire thorax and gaster and underside of legs with dense golden pubescence, unusually conspicuous on propodeum. Petiole ventrally with long erect hairs, latero-dorsally a row of very short hairs, base laterally with long hairs.

Male. — The male which I have associated with the females, mainly because of the rounded sides of the petiole, is much darker. Mandibles, base of antennae including scape, which is darkened dorsally, tegulae, greater part of fore femora, apex of mid

femora and foreside of fore and mid tibiae reddish-brown. Tarsi brown and reddish-brown. Petiole black. Stigma of wings dark brown, upper half of radial cell fuscated.

Scutum coarsely irregularly rugose, separate punctures only distinct in antero-lateral corners. Scutellum longitudinally rugose and distinctly punctate. Pronotal angles rectangular in frontal view. Scape of antennae nearly twice, segment 3 nearly three times, segments 4—5 about 1½ times as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, last segment over 1½ times as long as broad at base. Tyloidea on antennal segments 7—9 small and low, papilliform, smaller on segment 6. Antennal segments slightly rounded below. Pubescence duller than in female.

Genitalia (Fig. 21—25) yellowish-brown; basiparameres without inner shoulder, parameres relatively broad, before apex abruptly narrowed, below with long hairs. Apical spine (Fig. 26) with tip very strongly bent upward, even somewhat backward.

Peru: 1 ♀, holotype, 1 ♂, allotype, Cuzco, Rio Tambo (MF); 1 ♀, Loreto, Pucallpa (MF).

Brazil: 1 ♀, paratype, Mato Grosso, 12°50′ S., 51°47′ W., 6 May, 1968, Cerradão, O. W. Richards, Royal Soc. and Royal Geogr. Soc. Exp. (BM). This specimen has a somewhat reddish clypeus, the pronotal angles are distinctly spicate, only the apical half of the pygidial area is keeled and the central area of the scutellum is more extensively rugose.

P. auriger is characterized by the absence of lateral grooves of the petiole, the beautiful golden pubescence and in the female also by the extent of the red colour.

Psen (Pseneo) aurifrons (Taschenberg) (Fig. 27)

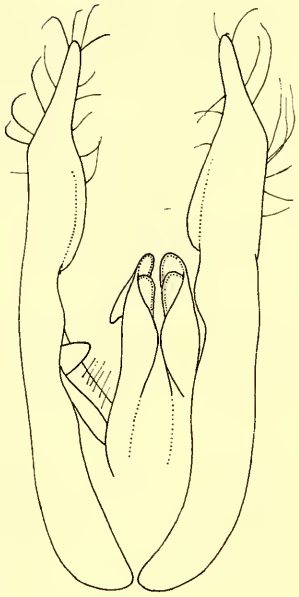
Taschenberg, 1875: 387—388, ♂ (*Mimesa aurifrons* partim; "Brasilia").
Dalla Torre, 1897: 351.
? Fox, 1898a: 378 (*Psen aurifrons;* Brazil: Chapada).

Taschenberg's description was based on a female and a male which in fact represent two different species. R. M. Bohart designated the male in the collection of the Zoological Institute, Halle, as lectotype; the female is the holotype of the new form *taschenbergi.*

Redescription of lectotype. Male. — Length about 10 mm. Black; first four segments of flagellum reddish below, reddish-brown above. Palpi yellowish-brown. Pronotal tubercles dark brown. Tibiae and tarsi reddish-brown, also great part of foreside of fore and mid femora and dorsal part of all femora, tibial spurs reddish-yellow. Tegulae reddish-brown. Wings yellowish, veins dark brown, stigma yellowish-brown.

Frons and vertex with coarse punctures, on vertex mostly narrowly separated. Behind ocelli somewhat transversely striate. Postocellar area slightly raised. Scape of antennae thick, about 1¾ times longer than broad, segment 3 nearly 3 times, segments 4—5 nearly twice, segment 6 about 1¾ times, segments 7—12 about 1½ times as long as broad at apex, last segment about twice as long as broad at base. Segments 4—6 with narrow oblong tyloidea, short on segment 4, longer on segment 5, on segment 6 longer than width of segment, segments 7—10 rounded below, with oval, shining black, tyloidea, a small tyloides on segment 11. Tyloidea distinctly larger than in *P. longiventris.*

Pronotum strongly spicate. Scutum densely coarsely punctate, also antero-laterally on disk tendency to longitudinal striation, no distinct rugae. Scutellum longitudinally



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28

Fig. 27—28. Male genitalia, dorsal aspect. 27, (*Psen* (*Pseneo*) *aurifrons* (Taschenberg); 28, *Psen* (*Pseneo*) *claviventris* (Cameron), Mexico; right paramere (left in figure) bent downwards

rugoso-punctate, anterior half with large shining interstices. Mesopleura and mesosternum distinctly finely punctate, interstices a few times larger than punctures, upper half somewhat striate, hypo-epimeral area with coarse rugae, anterior plate of mesepisternum somewhat rugulose. Acetabular carina medially distinctly roundly protruding. Petiole over twice as long as first tergite, dorsally and ventrally smooth and flattened, sides with distinct groove. Legs normal, a few weak thorns on outer side of hind tibiae.

Pubescence of face and pronotum pale golden, mostly appressed, of rest of head, scutum, scutellum and metanotum brown, of propodeum golden-brown, of mesopleura, mesosternum and legs pale golden. Gaster brownish-golden pubescent. Underside of petiole laterally with long erect hairs, dorsally with lateral rows of very short hairs.

Genitalia (Fig. 27, male from Nova Teutonia (BM)) light brown, parameres long and slender, apical part narrower, underside with long bent hairs. No distinct shoulder on inner side of basiparameres.

Female. — Similar. Length about 11—13 mm. Apart from dorsal side of fore and mid femora also their entire foreside, apices of hind femora, tibiae and tarsi reddish. Veins and stigma of fore wings somewhat paler.

Scape of antennae over twice, segment 3 about four times, segments 4—5 over twice as long as broad at apex, following segments gradually decreasing in length, segments 10—11 about quadrate, segment 12 about 1½ times as long as broad at base. Punctation of scutum less rugose, more striato-punctate. Mesopleura very finely punctate, no striae. Pygidial area shining, with complete median longitudinal keel, along margin a row of strong punctures. Pubescence of face and pronotum golden, mostly appressed, of

mesopleura and mesosternum paler golden, of scutum, scutellum, metanotum and propodeum brownish-golden.

Lectotype (designated by R. M. Bohart): ♂, Nova Friburgo, Brazil (ZIH).

New records. — Brazil: 1 ♀, "Brasilia, Mus. Drews." (ZMC); Santa Catarina, Nova Teutonia, 27° S. 52—58° W., 1 ♂, 4 Dec., 1938, Fritz Plaumann (BM), 1 ♀, 4 March, 1963, 1 ♂, Febr., 1968, Fritz Plaumann (MCZ); Rio de Janeiro, 1 ♀, 27 Febr., 1966, H. and M. Townes; Sao Paulo, S. J. Barreiro, Serra da Bocâina, 1650 m, 1 ♀, Nov., 1968, Alvarenga and Seabra; Minas Gerais, Serra do Caraca, S. Barbara, 1 ♂, Jan., 1970, F. M. Oliveira (HT).

P. aurifrons is close to *P. aureolus* but is distinguished by the densely punctate scutum and vertex, reddish legs and golden pubescence of mesosternum; the antennae of the males are different. It differs from *P. auriger,* which also has a densely punctate scutum and golden pubescent mesosternum, in the more densely punctate vertex, the laterally grooved petiole, which is dark, and in the more protruding pronotal angles.

Dr. Ole Lomholdt, Copenhagen, kindly informed me that "Mus. Drews." is to be regarded as Coll. Drewsen. Drewsen was a Danish entomologist living about a century ago. He received insect collections both from Europe and from South America.

I could not yet trace the two specimens recorded from Chapada, Brazil, by Fox (1898a).

Psen (Pseneo) claviventris (Cameron) (Fig. 28)

Cameron, 1891: 139, ♀ (*Mimesa claviventris*; Mexico: Guerrero).
Dalla Torre, 1897: 352, ♀ (*Mimesa claviventris*).
Ashmead, 1899: 225, ♀ (*Mimesa claviventris*).

Female. — Length about 9 mm. Black; base of flagellum reddish below, more or less brownish above, apex of mandibles dark reddish, palpi yellowish-brown, tibial spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings dark brown, upper part of radial cell dark fuscous.

Frons and vertex densely coarsely punctate, interstices mostly smaller than punctures. Behind lateral ocelli a small shining area, fore part of postocellar area with large interstices. Upper half of tempora finely striato-punctate. Scape of antennae about twice as long as broad at apex, segment 3 about four times, segment 4 about 2½ times, following segments gradually decreasing in length, segment 11 about as long as broad, segment 12 about 1½ times as long as broad at base.

Pronotal angles spicate, very acute in frontal view. Scutum coarsely rugoso-punctate, longitudinal rugae less distinct than in *P. longiventris.* Scutum laterally finely punctate, without distinct interstices. Scutellum striato-punctate. Mesopleura densely deeply punctate, interstices mostly larger than punctures, punctures smaller than on frons and vertex, upper part of mesopleura somewhat transversely striate. Hypo-epimeral area with punctures and coarse oblique rugae. Petiole over twice as long as first tergite, with lateral groove. Pygidial area with median keel on apical half.

Pubescence of face silvery, of pronotum very pale golden (in the type almost silvery). Vertex and scutum yellowish-grey, scutellum and propodeum very pale golden, tempora, mesopleura, mesosternum and legs whitish pubescent, base and apex of inner side of hind tibiae very densely so. Gaster very pale golden pubescent. Petiole ventrally with long erect hairs, dorsally with lateral rows of very short hairs.

Male. — Similar. Length about 9 mm. Face silvery. Scape about 1½ times, antennal segment 3 about 2⅓ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about quadrate, last segment about 1½ times as long as broad at base. Antennal segments 4—11 with small, shining, papilliform tyloidea. Genitalia (Fig. 28) yellowish-brown. Basiparameres without inner tooth or shoulder; parameres near apex abruptly narrowed.

New records. — Mexico: Morelos state, 4 mi. E. of Cuernavaca, 6000 ft, 4 ♀, 2—20 June, 1959, 1 ♂, 2 June, 1959, H. E. Evans (CU); Durango, 24 mi. W. of La Ciudad, 7000 ft, 1 ♀, 28 June, 1964, W. R. M. Mason (CNC); Vera Cruz, Cordoba, 1 ♀, 5 Oct., 1966, Peters leg. (SMF).

In the females from Morelos State the face is pale golden, the scutum is laterally and antero-laterally somewhat striato-punctate.

The type (BM, no. 21.824) and the specimens recorded here have the back of the propodeum dull and normally coarsely irregularly reticulato-carinate (Cameron (1891): "median segment coarsely punctured, irregularly reticulated"). The lateral punctures of the pygidial area are distinct, rather large but not very deep, each with a long bristle. There is a distinct median keel on the apical half. (Cameron: "pygidial area shining, stoutly keeled down the centre, impunctate (!)").

I have some doubt with regard to the correct identification of the female from Cordoba, as the radial cell is only slightly infuscated, the pubescence of the hind legs is somewhat yellowish instead of silvery-white, the punctation of the vertex is less dense and the keel of the pygidial area continues, less distinctly, on the basal half.

Psen (Pseneo) aureolus sp. nov. (Fig. 29, 30)

Female. — Length about 9—11 mm. Black; labrum, median part of mandibles, base of antennae including scape and pedicel and last segment below, tegulae, foreside of fore and mid tibiae and often base of hind tibiae reddish. Tarsi brown, rarely reddish-brown. Palpi yellowish-brown. Pronotal tubercles reddish-brown. Veins of wings dark brown.

Frons and vertex densely punctate, on vertex transversely striato-punctate, postocellar area with narrow interstices between punctures, anteriorly with small impunctate area. Scape of antennae about twice as long, antennal segment 3 about four times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 shorter than broad, last segment about 1½ times as long as broad at base.

Pronotum distinctly spicate. Rugae on scutum weaker than in *P. longiventris,* more irregular, punctures stronger and more numerous. Scutellum longitudinally rugoso-punctate, anteriorly with shining interstices. Mesopleura finely but distinctly punctate, interstices a few times larger than punctures, upper part with tendency to transverse striation; hypo-epimeral area usually with rugae and punctures on upper half. Petiole about twice as long as first tergite, with distinct lateral groove. Pygidial area with longitudinal median keel, strongest on apical half.

Pubescence of clypeus golden or pale golden, of frons, tempora and vertex golden. Pronotum dorsally pale golden pubescent. Scutum, scutellum and metanotum brownish-golden, propodeum greyish-golden, mesopleura and mesosternum whitish pubescent. Legs and gaster pale golden, sometimes almost whitish pubescent. Petiole ventrally with

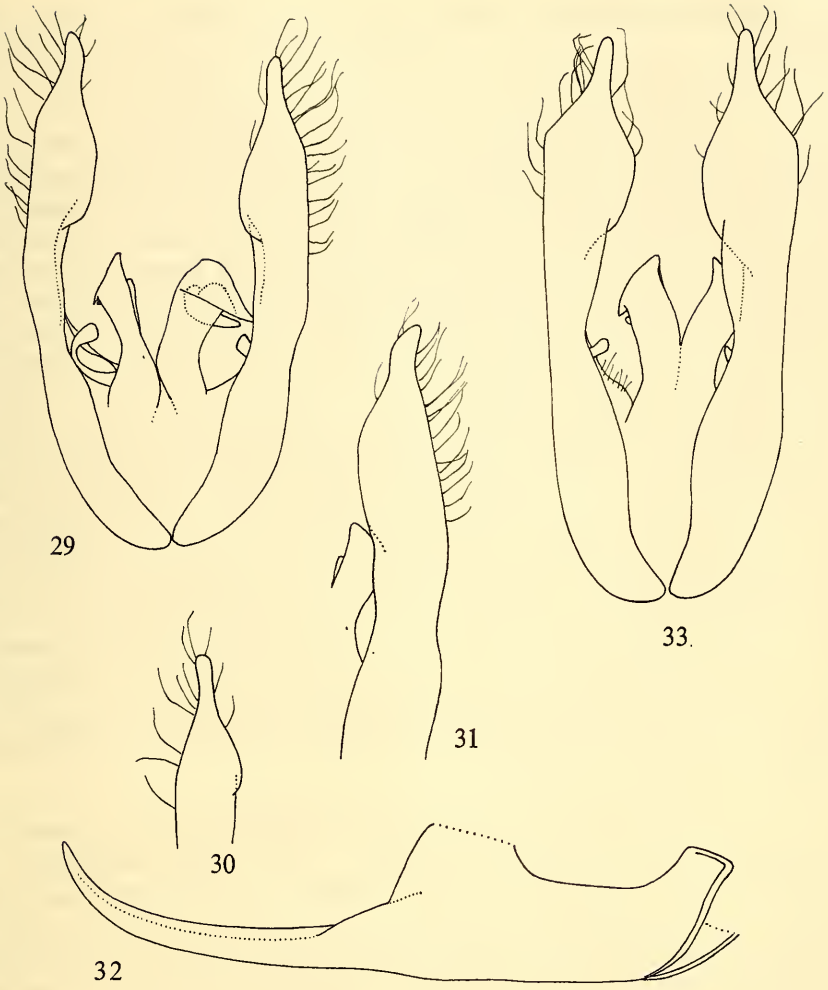

Fig. 29. *Psen* (*Pseneo*) *aureolus* sp. nov., ♂, allotype, genitalia, dorsal aspect. Fig. 30. *Psen* (*Pseneo*) *aureolus* sp. nov., ♂, Venezuela, apex of right paramere. Fig. 31—32. *Psen* (*Pseneo*) *aureolus* sp. nov., var., ♂, 31, left paramere, dorsal aspect; 32, eighth sternite, lateral aspect. Fig. 33. *Psen* (*Pseneo*) *funicularius* sp. nov., ♂, holotype, genitalia, dorsal aspect

long erect pale hairs, dorso-laterally with a row of very short hairs.

Male. — Length 8 mm. Punctation of mesopleura coarser than in female. Scape of antennae about twice, segment 3 about 2½ times, segments 4—6 about twice, segment 7 about 1½ times, segments 8—12 about 1¼ times as long as broad at apex, last segment nearly twice as long as broad at base. Segments 3—10 or 3—11 with small, shining, papilliform tyloidea, on segments 3—4 somewhat elongated.

Genitalia (Fig. 29—30) yellowish-brown, apices brown. Basiparameres without inner shoulder; parameres basally broad, apices abruptly narrowed, underside and outer margin below with long pale hairs.

Holotype: ♀, Brazil, Santa Catarina, Nova Teutonia, Dec., 1953, F. Plaumann

(OSU, GRF 1972). Allotype: ♂, same locality, 13 March, 1952, F. Plaumann (OSU, GRF 1972).

Brazil: Santa Catarina, Nova Teutonia, 27°11′ S., 52°23′ W., 300—500 m, 7 ♀, April, 1951, 8 March, 1961, 3 March, 1963, Febr., 1966, 30 March, 1966, Nov., 1966, March, 1968, 1 ♂, Jan., 1967, all coll. Fritz Plaumann (MCZ); 1 ♀, 11 March, 1951, 300—500 m (UI); 4 ♀, Dec., 1956, Febr.—March 1959, all coll. F. Plaumann (OSU, GRF 1972); 1 ♀, 28 Jan., 1957, F. Plaumann (CU); Paraná, 1 ♀, Cascavel, Jan., 1962, S. Laroca (UFP); Quatro Barros nr. Curitiba, 1 ♀, 5 Febr., 1966, H. & M. Townes (HT); Mato Grosso, 12°50′ S., 51°47′ W., Gallery Forest, 1 ♀, 19 March, 1968, O. W. Richards, Royal Soc. and Royal Geogr. Soc. Exp. (BM); Minas Gerais, 1 ♀, Alpinopolis, Febr., 1961, C. Elias, 1 ♀, Perdizes, 8 April, 1965, C. Elias (UFP); Pará, 2 ♀ and 2 ♂, Jacareacanga, Oct., 1959, M. Alvarenga (UFP). All paratypes except the female from Mato Grosso.

Argentina: Tucumán, Dpto. Tafí, Horco Molle, 4 ♀, 26 Dec., 1965, 18 Jan. and 20—26 March, 1966, L. Stange, 1 ♀, 21 March, 1970, C. Porter (IML), 2 ♀, 2—15 Nov. and 10—23 Dec., 1967, 1 ♂, 1—5 Jan., 1968, C. C. Porter (MCZ), ca. 12 km W. of Tucumán, 700 m, 1 ♀, 17 March, 1974, C. R. Vardy (BM); San Pedro de Colalao, 2 ♀, Foerster leg. (MF), 3 ♀, with cocoons, April, 1965, R. Golbach (IML); Jujuy, 1 ♀, 13 Jan., 1966, H. & M. Townes (HT), 1 ♀, Jujuy, Alto da Viña, 13—20 March, 1966, C. C. Porter (MCZ); Salta, 1 ♀, Urundel, 31 Jan., 1950, R. Golbach (IML), 1 ♀, nr. Pocitas, 28 April, 1968, C. Porter (MCZ); Misiones, Iguazú Nat. Park, c. 140 m, 1 ♀, 8—11 April, 1974, C. and M. Vardy, 1 ♀, 10—11 April, 1974, hosteria Hoppe, Malaise trap, C. R. Vardy (BM). All paratypes.

Uruguay: 1 ♀, Dept. Tacuarembo, 40 km NW. Tacuarembo, 2—9 Febr., 1963, J. K. Bouseman (AMNH). Paratype.

Paraguay: 1 ♀, Pirapo, Dec., 1971, Peña (MF). Paratype.

Peru: 1 ♀, Cord. Azul, Previsto, 700 m, 5 May, 1965, J. M. Schunke (BM); 1 ♀, Tingo Maria, 20—27 Jan., 1968, A. Garcia and C. Porter (MCZ). Paratypes.

Venezuela: 1 ♂, Paratepuy (Peraitepuy?), Bolívar, 16 Dec., 1940, P. J. Anduze (CU).

Guyana: 1 ♀, Essequibo R., Moraballi Creek, 25 Sept., 1929, Oxford Univ. Exp., 1 ♂, Kaieteur, Savannah, 5 Sept., 1937, Richards and Smart (BM).

The vertex of the female from Mato Grosso, Brazil, is not densely punctate, hardly striate, the mesopleura are very sparsely and finely punctate, the hypo-epimeral area is almost smooth; the female from Guyana has similar vertex and mesopleura. The male from Guyana has a densely punctate vertex but almost impunctate mesopleura and a distinct tyloides on the 11th segment of the antennae.

P. aureolus and *P. claviventris* are much alike; the genitalia of the males (Fig. 28—30) and the tyloidea on the antennae are almost identical. The antennal segments of the male of *P. aureolus* are slightly longer than those of the single male of *P. claviventris* which could be examined. The main difference is in both sexes in the colour of the pubescence which is distinctly pale golden on frons, pronotum etc. of *P. aureolus*. The punctation of the latter species is slightly weaker.

P. aureolus is also similar to *P. longiventris* which has stronger rugae on the scutum and finer punctation of vertex and mesopleura. The genitalia of the males of these two species are distinctly different (Fig. 19 and 29).

The cocoons, about 11 mm long, are brown, also their inside, and very solid. The

outer side is covered with dark brown particles of wood and numerous chitinous remains, including wings, of small Homoptera.

Psen (Pseneo) aureolus sp. nov., var. (Fig. 31, 32)

A number of specimens which I believe belong to *P. aureolus,* differ not only in having a black scape but also by the somewhat less densely punctate vertex which is not transversely striate, or hardly so. The genitalia and antennal tyloidea of the male do not differ perceptibly from the form with red scape.

The colour of the scape not being a reliable characteristic and the difference in the sculpture of the vertex being small, this form probably merely represents a variety of *P. aureolus.*

Brazil: Santa Catarina, Joinville, 1 ♀, 8—9 Febr., 1969, C. Porter and A. Garcia (MCZ); Paraná, Prudentópolis, 2 ♀, 23—25 Febr., 1969, C. Porter and A. Garcia (MCZ); Rio de Janeiro, Gavea nr. Rio, 1 ♂, 27 Aug., 1923, W. S. Bristowe, number 35622, O. W. Richards Collection (BM), Rio de Janeiro, 1 ♀, 6 March, 1966, H. & M. Townes (HT); Reprêsa do Rio Grande, Guanabara, 6 ♀, June, 1966, June, Oct., and Dec., 1967, March, 1968, March, 1972, M. Alvarenga (HT).

Peru: 1 ♀, Tingo Maria, 620 m, 5—12 Oct., 1964, C. C. Porter (MCZ); 1 ♀, Cuzco, Valle del Rio Cogñipata, Hacienda Santa Isabel, 1700 m, 2 Jan., 1952, F. Woytkowski (IML).

Ecuador: 1 ♀, Taudapi, 1400 m, 15—20 June, 1965, L. Peña (MCZ).

In the male from Gavea, Brazil, the mesopleura are coarsely rugoso-punctate, with shining interstices below. Genitalia Fig. 31. Eighth sternite Fig. 32.

Psen (Pseneo) funicularius sp. nov. (Fig. 33)

Male (holotype). — Length about 11 mm. Much resembling *P. aureolus.* Sculpture of frons and vertex less rugose, between oculi and ocelli and behind ocelli shining interstices. Antennal segments 6—10 with long narrow tyloidea, short on segment 6, on segment 7 about as long as greatest width of segment, on segments 8—10 somewhat broader, gradually decreasing in length, on segment 11 reduced to a small shining point.

Scape of antennae black, tibiae reddish, on outer side near apex with black mark, tarsi brown, apices of tarsal segments of mid and hind legs reddish. Veins of wings dark brown.

Pubescence distinctly golden, pale golden on mesosternum and underside of gaster, more brownish on vertex, scutum, scutellum and metanotum, dense on gaster.

Genitalia (Fig. 33) different from *P. aureolus,* the narrowed apices of parameres being straight, not slightly bent outwards.

Brazil: 1 ♂, holotype, Santa Catarina, Nova Teutonia, Febr., 1968, Fritz Plaumann (MCZ).

P. funicularius is evidently close to *P. aureolus* but the tyloidea of the antennae and the genitalia are different, as well as the pubescence of mesopleura and mesosternum and the colour of the hind tibiae.

A damaged female from Colombia may belong to this species but this identification should be substantiated by more material. The vertex is rather densely punctate with

narrow interstices, and a rather large shining impunctate area on the outer side of and behind the posterior ocelli. Legs black.

Colombia: 1 ♀, Colombia Orient., Cundinamarca, Monterredondo (MF).

Psen (Pseneo) magnificus sp. nov.

Female (holotype). — Length about 10 mm. Black; antennae including scape, mandibles except apices, legs including trochanters, and tegulae red, apical half of flagellum above brown. Veins of wings including stigma brown.

Frons below ocelli finely punctate, interstices partly larger than punctures, vertex also finely, more sparsely, punctate, behind ocelli a large impunctate area. Tempora almost smooth. Mandibles broad. Scape of antennae about 2½ times as long as broad at apex, third antennal segment over 3½ times, segments 4—5 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 nearly quadrate, last segment about 1½ times as long as broad at base. Pronotal angles distinctly spicate. Scutum striato-punctate, medially with distinct longitudinal rugae, laterally and antero-laterally with distinct shining interstices. Scutellum punctate with shining interstices a few times the size of the punctures. Mesopleura and mesosternum minutely sparsely punctate, hypo-epimeral area shining with a few weak rugae. Petiole about twice as long as first gastral tergite, cylindrical, sides slightly narrowly depressed or at least flattened. Pygidial area narrowly triangular, as usual, with rounded apex, shining, large punctures along sides and median carina distinct on apical half.

Pubescence golden, somewhat paler on mesosternum, very dense on frons and clypeus, tempora, pronotum, mesopleura and back of propodeum, much appressed.

Male unknown.

Brazil: 1 ♀, holotype, "Para 70 16" (small round lightpurple label) (BM).

This species resembles *P. auriger* which is also entirely densely golden pubescent and has red legs, but it differs in having a black petiole, in the flattened instead of rounded sides of the petiole and in the much less coarsely sculptured scutellum.

Psen (Pseneo) argentinus (Brèthes) (Fig. 34)

Brèthes, 1910: 283, ♀ (*Mimesa argentina*; Argentina).

Female. — Length about 10 mm. Black; base of flagellum, apex of last segment below and tegulae reddish. Palpi and last segments of tarsi brown. Veins of wings including stigma dark brown.

Frons, vertex and interocellar area densely coarsely punctate, vertex somewhat transversely striate. Upper part of tempora finely striato-punctate. Scape of antennae about twice, segment 3 nearly four times, segment 4 over twice, segment 5 twice as long as broad at apex, following segments gradually decreasing in length, segment 11 about quadrate, segment 12 about 1½ times as long as broad at base. Pronotum strongly spicate. Scutum densely punctate, medially somewhat striato-punctate, scutellum longitudinally rugoso-punctate with narrow shining interstices. Mesopleura densely finely punctate, interstices often smaller than punctures, upper part somewhat longitudinally striato-punctate, hypo-epimeral area shining, coarsely obliquely rugose. Petiole about twice as long as first tergite, lateral groove shallow. Pygidial area flat, apically a number of fine punctures, a row of large punctures along the sides, no distinct median keel.

Pubescence of face and pronotum silvery. Vertex and thorax dorsally with yellowish-grey pubescence, more brownish and short on greater part of scutum, on which anteriorly also a number of long whitish hairs. Pubescence of tempora, mesopleura, mesosternum, gaster and greater part of legs whitish. Petiole with latero-dorsal rows of mostly short hairs, ventrally with long erect hairs.

Male. — Similar. Length about 8 mm. Base of flagellum darker above. Sculpture of frons, vertex, scutum and scutellum coarser and more irregular. Mesopleura stronger punctate. Scape of antennae about 1½ times, segment 3 about 2½ times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segment 12 about 1½ times as long as broad at apex, segment 13 nearly twice as long as broad at base. Tyloidea on segment 5 very small and indistinct, on segments 6—11 shining black, papilliform, smaller on segment 6, an indistinct tyloides on segment 12. Underside of segments 6—11 angularly broadened, when seen from behind. In the male from Entre Ríos the tyloidea are somewhat larger.

Pubescence of gaster pale golden.

Genitalia (Fig. 34) yellowish-brown, apices of parameres dark brown, with long hairs on underside. Parameres slender, basiparameres with distinct inner shoulder.

New records. — Argentina: prov. Buenos Aires, 2 ♀, Moreno, 1 ♀, Moreno, Oct., 1970, 1 ♀, Moreno, Nov., 1973, 1 ♀, Glew, Carpintero Coll. (MF); 1 ♀, La Plata, 11 Dec., 1965, H. and M. Townes (HT); 12 ♀, La Plata, Fac. Agronomiá, Sept.—Nov., 1968, C. Porter, 1 ♀ and 1 ♂, La Balandra, 19—30 Nov., 1968, C. C. Porter (MCZ); 1 ♂, prov. Entre Ríos, Palmar Colón, Zelich (MF).

The first mentioned three females, from Moreno, were labelled *"Mimesa argentina* Breth." by Mr. M. F. Fritz, Buenos Aires. The males from LaBalandra and Palmar Colón (Entre Ríos) agree in all details studied — the gaster of the type is missing — with the male type (MACN), of which the pubescence is somewhat paler than in the fresh males. The tyloidea of the type are of the same size as those of the male from LaBalandra. It is labelled "chasseur de Hémiptères, B.A. 6.XI.1902, Brèthes". It also carries a label written in a different, darker, ink *"Mimesa argentina"* and a printed label "Col. J. Brèthes". Brèthes described the female as well as the male, and apparently collected a female with her prey, although this was not mentioned in his publication. As Mr. Fritz informed me, a female could not be found in the museum of Buenos Aires. The female collected at Glew by Carpintero (MF) carries a Jassid on the pin.

Psen (Pseneo) taschenbergi sp. nov. (Fig. 35)

Taschenberg, 1875: 387—388, ♀ (*Mimesa aurifrons* partim; "Brasilia").
Dalla Torre, 1897: 351, ♀ (*Mimesa aurifrons* partim).

Female. — Length 10—11.5 mm. Black; base of flagellum, tegulae, base of hind tibiae, all tarsi, reddish-brown. Palpi yellowish-brown. Labrum dark reddish. Pronotal tubercles black. Foreside of fore and mid tibiae brown. Spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings including stigma dark brown.

Frons, interocellar area and vertex, densely coarsely punctate, vertex with tendency to transverse striation. Upper part of tempora finely densely punctate, lower part smooth. Scape of antennae about twice as long as broad, segment 3 about four times, segments 4—5 about twice, segments 6—7 about 1½ times as long as broad at apex, segment 8 slightly longer than broad, segments 9—11 about quadrate, last segment nearly 1½ times as long as broad at base.

Pronotum spicate. Scutum very densely coarsely punctate, also its antero-lateral corners. Scutellum coarsely longitudinally rugoso-punctate. Mesopleura and mesosternum finely punctate, interstices equal to or larger than punctures. Hypo-epimeral area coarsely rugose. Anterior plate of mesepisternum dull, striato-punctate. Acetabular carina medially little protruding. Petiole dorsally flattened, laterally with distinct longitudinal groove. Surface of pygidial area shining, an irregular row of large punctures along the margin, no median keel.

Pubescence of head pale golden, face somewhat paler. Pubescence of pronotum golden, of dorsum and back of thorax and of gaster golden-brown, mesopleura paler, mesosternum pale golden or yellowish, in fresh specimens mesopleura and mesosternum almost whitish. Petiole below with row of long erect hairs.

Male. — Similar. Length 8—9.5 mm. Sculpture of head, mesopleura and mesosternum somewhat coarser. Legs black, tarsi brownish. Pubescence of face more silvery.

Scape about 1¾ times as long as broad, third segment 2¾ times, segments 4—6 about twice as long as broad at apex, following segments gradually shorter, segment 12 about 1⅓ times as long as broad at apex and last segment about 1¾ times as long as broad at base. Fourth segment with point-shaped or indistinct tyloides, segment 5 with short narrow tyloides, segment 6 with small, segments 7—12 with larger, papilliform, black and shining tyloidea, distinct in lateral view, often segment 12 with narrow or indistinct tyloides.

Genitalia (Fig. 35) long, yellowish-red, apex of parameres blackish, narrow, rounded tip.

Holotype: ♀, Brazil, Rio de Janeiro, Nova Friburgo (ZIH) (*Mimesa aurifrons* det. Taschenberg, *Pseneo? aurifrons* Taschenberg, det. R. M. Bohart). Allotype: ♂, Santa Catarina, Nova Teutonia, 27°11′ S, 52°23′ W, 300—500 m, Dec., 1966, Fritz Plaumann (CNC). The following specimens are all paratypes.

Brazil: Santa Catarina, Nova Teutonia, 27°11′ S., 52°23′ W., 1 ♂, 29 Nov., 1937, Fritz Plaumann (Coll. van Lith), 1 ♀, 20 Oct., 1938, Fritz Plaumann (BM), 4 ♀, 31 March and 25 Nov., 1952, Nov., 1953, F. Plaumann (OSU, GRF 1972), 1 ♂, Nov. 1958, F. Plaumann (OSU), 3 ♀, 16 Febr., 1955, 27 Dec., 1955, 5 March, 1956, F. Plaumann (CU); Paraná, 1 ♀, Campina Grande nr. Curitiba, 15 Febr., 1966, H. & M. Townes (HT).

Argentina: Tucumán, 1 ♀, Amaicha, 19 Nov., 1966, L. Stange, 1 ♂ Cadillal, 16—23 Jan., 1957, R. Golbach, 1 ♀, Farrallón Blanco, Dpto. Burruyacú, 7—8 Febr., 1961, R. Golbach, 1 ♀, Reserva Forestal Camino a Salta, 17 April, 1951, A. Willink, 1 ♀, Lacavera, Dpto. Tafí, 28 Nov., 1951, R. Golbach, 1 ♀, Traucas-Tacanas, Febr., 1951, J. M. Arnzu, Horco Molle, Dpto. Tafí, 1 ♀, 18 Jan., 1966, L. Stange, 3 ♀, 21 March and 19 Nov., 1970, 24 Nov., 1971, C. Porter (IML), 1 ♀, Horco Molle, nr. Tucumán, 19 Jan., 1966, H. & M. Townes (HT); 1 ♀, San Pedro de Colalao, Foerster leg. (MF), 1 ♀, San Pedro de Colalao, Traucas, Febr., 1951 (OSU, GRF 1972); 1 ♀, Jujuy, Los Perales, 6 Febr., 1950, Mourós-Willink (IML), 4 ♀, Jujuy, 14—15 Jan., 1966, H. & M. Townes (HT); Córdoba, 1 ♀, Chancon, 20 km NE., 1000 m, Febr., 1966, L. Stange (IML); Misiones, 1 ♂, Leandro N. Alem, Inst. Alberdi, 17—19 Nov., 1969, C. Porter (IML); Salta, 1 ♀, Urundel, 31 Jan., 1950, R. Golbach, 1 ♀, Campamento Jakúlica, 40 km E. Aguas Blancas, 20 Sept., 1971, Malaise trap, C. Porter, 1 ♂, Yacochuya (Cafayate), Malaise trap, Entomofauna Subandina, 1—15 Jan., 1969, Willink-Terán-Stange (IML).

Paraguay: Pirapo, 1 ♀, Peña, 11 ♂, Dec., 1971, Peña; 1 ♀, Caballero, Nov., 1971, Peña (MF).

Bolivia: 1 ♂, Santiago (MF).

In the females from Argentina and from Paraguay the scape of the antennae is reddish, in only two specimens from Argentina darkened or black; the pronotal tubercles are reddish-brown and the foreside of the fore tibiae is more reddish-brown. The punctation of the mesopleura of the males is often much stronger than in the females, especially in the males from Paraguay.

The female of *P. taschenbergi* is distinguished by the flat pygidial area, the dense punctation of vertex and scutum and the partly golden pubescence. The male is distinguished, apart from the punctation and the dark legs, by distinct tyloidea on the eleventh segment.

P.taschenbergi is much alike *P. argentinus* from which it seems to differ only in the golden pubescence of face and pronotum. The males are sometimes difficult to recognize, the more so as the genitalia and the antennal tyloidea seem to be identical. Further studies may prove that *taschenbergi* is to be regarded as a subspecies of *argentinus*.

Psen (Pseneo) auriventris sp. nov.

Female (holotype). — Length about 13 mm. Black; apex of mandibles, base of flagellum, tegulae, knees, tibiae and tarsi reddish; underside of mid and hind tibiae brown. Palpi brownish-yellow. Tibial spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings brown, stigma yellowish-brown.

Frons and vertex densely punctate, partly striato-punctate, upper part of tempora densely finely punctate, lower part smooth. Scape of antennae over twice, segment 3 over four times, segment 4 about 2½ times as long as broad at apex, following segments gradually decreasing in length, segment 11 about 1¼ times as long as broad at apex, last segment nearly twice as long as broad at base.

Pronotal angles weakly spicate in dorsal view, rectangular in frontal view. Scutum very densely striato-punctate, antero-lateral corners finer; scutellum rugoso-punctate, small shining interstices on fore part. Mesopleura and mesosternum superficially finely punctate, hypo-epimeral area coarsely rugose. Anterior plate of mesepisternum finely obliquely striate. Acetabular carina medially little protruding. Petiole over twice as long as first tergite, sides with shallow groove. Pygidial area flat, lateral row of mediumsized punctures.

Face with deep golden pubescence. Pubescence of head including tempora, entire thorax, gaster and legs golden pubescent. Petiole ventrally with long erect hairs, somewhat shorter hairs along latero-dorsal margins.

Male unknown.

Peru: 1 ♀, holotype, Chanchamayo, 4 May, 1948, D. G. Shappirio, 1970 (USNM).

P. auriventris is close to *P. taschenbergi* which also has a flat pygidial area and dense punctation of vertex and scutum. It is easily recognized by the beautiful golden pubescence and the reddish tibiae and tarsi.

Psen (Pseneo) eliasi sp. nov. (Fig. 36, 37)

Female. — Length about 9 mm. Head black; apical half of mandibles and labrum reddish, palpi yellowish-brown, antennal segments 3—6 and underside of segments 7 and 12 reddish. Thorax and gaster black; tegulae reddish, greater part of pronotal tubercles reddish-brown, foreside of fore and mid tibiae, base of hind tibiae and apex of pygidial area brownish. Tibial spurs yellowish-white. Veins of wings including stigmata brown.

Anterior margin of clypeus thickened, protruding, very slightly emarginate, not tridentate. Fine frontal carina, ending between antennae in a very low tooth. Frons and vertex densely punctate, vertex behind ocelli transversely striato-punctate, tempora

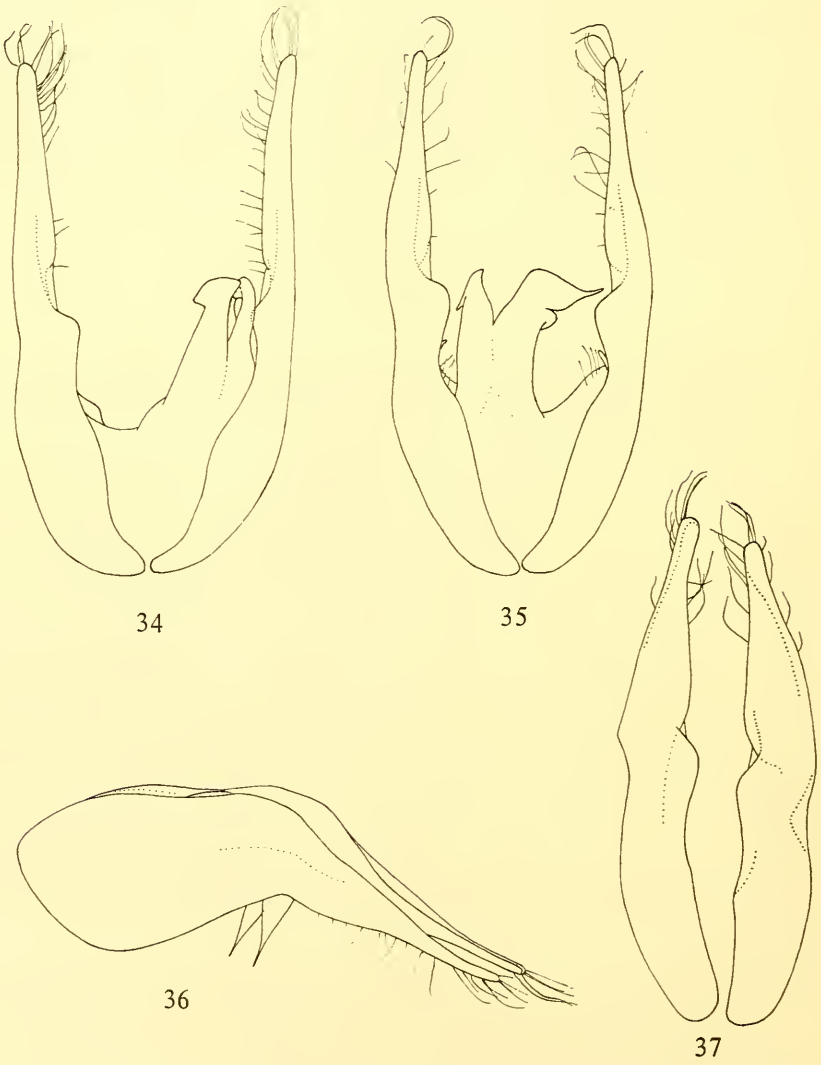

Fig. 34—37. Male genitalia of various species of *Psen* (*Pseneo*). 34, *P. argentinus* (Brèthes); 35, *P. taschenbergi* sp. nov., both dorsal aspect; 36—37, *P. eliasi* sp. nov., lateral and dorsal aspect

finely punctate. Postocellar area slightly raised. Occipital carina high, ending in hypostomal carina. Third antennal segment about 4 times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 shorter than broad, segment 12 about 1½ times as long as broad at base.

Pronotal angles spicate. Scutum and scutellum very densely coarsely punctate. Enclosed area of propodeum triangular, shining, back of propodeum coarsely reticulato-carinate. Mesosternum and mesopleura very densely finely punctate, hypo-epimeral area coarsely rugose. Acetabular carina complete. Anterior plate of mesepisternum obliquely striate, anterior oblique suture foveolate, widened part with a few transverse carinae. Legs and venation of wings normal.

Petiole over twice as long as first tergite in dorsal view, almost quadrate in cross-section, laterally depressed with distinct upper and lower ridges, dorsally with lateral irregular row of extremely fine hair-bearing punctures. Pygidial area narrowly triangular, flat, medially feebly raised, surface densely punctate, punctures reaching lateral margins except at base.

Pubescence of head, pronotum and metanotum pale golden, mostly appressed on face and pronotum. Scutum brownish-grey, propodeum yellowish-grey, mesopleura, mesosternum, gaster and legs whitish pubescent, pubescence rather dense on gaster including ventral plate of petiole and pygidial area. Petiole ventrally with lateral row of shorter and longer erect hairs, dorsally with some very short lateral hairs.

Male. — Similar. Length about 8 mm. Colour as in female but the male from Itapura has paler fore and mid tibiae and the antennal segments 3—7 are entirely, segments 8—13 ventrally reddish. The pubescence of face, pronotum and propodeum of this male is almost whitish.

Third antennal segment about 3 times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, segment 13 about 1½ times as long as broad at base. Segments 8—12 with shining black tyloidea, almost linear on segment 12, broad oval on the other segments, about half as long as the segments. Indistinct tyloidea on segments 6—7.

Genitalia (Fig. 36, 37) reddish-brown, resembling those of *P. argentinus* and *P. taschenbergi*; the inner shoulder of the basiparameres is more rounded and the parameres are less slender than in these latter two species.

Brazil: Minas Gerais, 1 ♀, holotype, and 1 ♂, allotype, Passos, 10—15 Dec., 1962, Claudionor Elias (UFP). The following specimens are all paratypes: Minas Gerais, Passos, 1 ♂, 12—17 Nov., 1962, 1 ♂, 17—22 Sept., 1962, 1 ♂, 10—15 Dec., 1962, 1 ♂, 17—22 Dec., 1962, C. Elias; Minas Gerais, Araxá, 1 ♀, 22 April, 1965, 1 ♀, 15 May, 1965, 4 ♂, 27 Oct., 1965, C. Elias; Minas Gerais, Uberaba, 1 ♂, Oct., 1961, C. Elias; Paraná, Palmeira, Papagaios Velhos, 1 ♂, 11 Dec., 1966, J. S. Moure; Rio de Janeiro, Petrópolis, 1 ♂, April, 1961, M. Alvarenga (all UFP); Mato Grosso, 1 ♂, Três Lagoas, 6—10 Dec., 1919, 1 ♂, Itapura, 6—9 Dec., 1919, Cornell Univ. Exped., R. G. Harris (CU).

The female of *P. eliasi* takes a unique position in the subgenus *Pseneo* because of its slightly emarginate, instead of tridentate, clypeal margin and above all because of the densely punctate pygidial area. The male is similar to *P. argentinus* and *P. taschenbergi* from which it differs in the tyloidea and the genitalia. The tyloidea resemble those of *P. simplicicornis.*

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INDEX

(The names of new species are marked with an asterisk)

angulatus 22
argentinus 34
* aureolus 30
aurifrons 27, 35
* auriger 25
* auriventris 37

barthi 8

* canalicus 25
cameroni 11
carolina 22
claviventris 29

* eliasi 38
* erythrocnemus 13
erythropoda 5

ferrugineus 22
fulvipes 22
* funicularius 33

irwini 7

kohlii 20, 22, 23

longiventris 22, 23

* magnificus 34
* metallicus 7
Mimesa 4, etc.
montezuma 23
monticola 4, 11
montivagus 11
myersiana 8

niger 22

* paranaensis 11
Pluto 15
Psen 2
Pseneo 7, 15
pulcher 9
punctatus 20, 22

simplicicornis 20, 22
spicatus 23
striolatus 5

* taschenbergi 35
unifasciculatus 11

venetus 9

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R. LINNAVUORI. — Studies on African Heteroptera, p. 43-65, fig. 1-72.

Tijdschrift voor Entomologie, deel 118, afl. 2 Gepubliceerd 06.VI.1975

STUDIES ON AFRICAN HETEROPTERA

by

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Contents

1. Material of aquatic and semiaquatic Heteroptera from the Ivory Coast, collected by R. H. Cobben 43
2. A new species of the genus *Hebrovelia* Lbl. (Het. Veliidae, Hebroveliinae) from the Central African Republic 54
3. On the genus *Daladeropsis* Karsch (Het. Coreidae, Coreinae, Daladerini) 56
4. *Carbula melanacantha* (F.) *breviscutum* subspec. nov. (Het. Pentatomidae) 64

Introduction

The present article is based on material of Heteroptera from the Guinean subregion, kindly sent for examination by Dr. M. Boulard and Dr. J. Carayon (Paris), Dr. R. H. Cobben (Wageningen), and Dr. P. H. van Doesburg (Leiden). The author is greatly indebted also to Dr. W. R. Dolling, British Museum (Natural History), for the loan of the holotype of *Daladeropsis africana* (Dl.) and to Dr. G. Schmitz, Tervuren Museum, for the sending of material of *Hebrovelia usingeri* Ps.

The following new taxa are described: *Naboandelus bergevini bouakeanus* subsp.n., *Hynesionella cobbeni* sp.n., *Microvelia pilipes* sp.n., *M. troilos* sp.n., *Mesovelia dentiventris mollis* subsp.n., *Hebrovelia carayoni* sp.n., *Daladeropsis africana ampliata* subsp.n., *D. pelops* sp.n. and *Carbula melanacantha breviscutum* subsp.n.

1. Material of aquatic and semiaquatic Heteroptera from the Ivory Coast collected by R. H. Cobben

Corixidae

Micronecta quewalepeie Hc. — Bandama, several ex., IV.1964. Widespread (South Africa, Sudan, Ghana).

Micronecta scutellaris (St.) — Bouaké, several ex., 22—29.IV.1964. Widespread: the Ethiopian region, Egypt, Israel, India.

Stenocorixa protrusa Hv. — Bouaké, 1 ex., 22—23.IV.1964. Very common in the Sudan. Also known from Chad and the Congo.

Agraptocorixa dakarica J. — Bouaké, 4 ex., IV.1964. Known from West Africa, the Sudan, Kenya and the Congo.

Pleidae

Plea pullula (St.) — Bouaké, several ex., IV.1964. Widespread (Ethiopian region, Egypt, Israel).

Notonectidae

Anisops pellucens Gst. — Adiopodoumé, 1 ex., IV-V.1964; Jéalé, 2 ex., XII.1967 (P. J. Hummelen). Widespread: the Ethiopian region, Madagascar, S.W.Arabia.

Anisops adonis Hc. — Bouaké, 3 ex., 22—23.IV.1964. Known from Nigeria and the Sudan.

Anisops jaczewskii Hc. — Bouaké, 2 ♀ probably of this species, IV.1964. Widespread (West Africa, Chad, Sudan, Congo, East Africa, Southern Africa).

Anisops sardea (H.—S.) — Bouaké, 2 ex., IV.1964. Palaeotropical.

Anisops debilis debilis Gst. — Bouaké, 3 ex., IV.1964. Widespread in tropical Africa.

Anisops lanceolata Ps. — Lamto, 1 ex., 28.IV.1964. West Africa.

Enithares sobria St. — Adiopodoumé, 1 ex., IV—V.1964; Jéalé, 2 ex., XII.1967 (P. J. Hummelen). Widespread in the Ethiopian region, also known from Morocco.

Neonychia congoensis Hf. — Bouaké, 1 ex., IV.1964; Lamto, 1 ex., 29.III.1964. Previously known from Togo and the Congo, ssp. *soudani* Ps. from the Sudan.

Nychia limpida St. — Adiopodoumé, 2 ex., IV-V.1964. Palaeotropical.

Naucoridae

Naucoris obscuratus Mtd. — Adiopodoumé, 3 ex., IV-V.1964. Widespread in the Ethiopian region.

Belostomatidae

Hydrocyrius columbiae Spin. — Ivory Coast, 1 ex., 1957 (J. de Wilde). Nearly all Africa, Arabia.

Sphaerodema nepoides (F.) — Adiopodoumé, 1 ex., IV—V.1964; Bouaké, several ex., IV.1964. Widespread in tropical Africa.

Nepidae

Laccotrephes ater (L.) — Adiopodoumé, 1 ex., IV—V.1964. Widespread in tropical Africa.

Laccotrephes sp. probably new. — A small and narrow species. — Adiopodoumé, 1 ♀, IV—V.1964.

Ranatra parvipes vicina Sgn. — Adiopodoumé, several ex., IV—V.1964; Bouaké, 1 ex., 22—23.IV.1964. Nearly all Africa, Egypt, Israel.

Ranatra emaciata guineensis Ps. — Adiopodoumé, 4 ex., IV—V.1964. Guinean.

Gerridae

Rhagadotarsus (*Caprivia*) *hutchinsoni* Ch. — Adiopodoumé, 2 ex., IV—V.1964; Bouaké, 1 ex., IV.1964; Lamto, 1 ex., 28.IV.1964. Widespread in tropical Africa.

Naboandelus bergevini bouakeanus subspec. nov. (Fig. 1—3)

Length: forma macroptera 4 mm; forma aptera ♂ 2.25 mm; forma aptera ♀ 2.75—3 mm. Apterous ♂: Black with distinct metallic lustre. Lateral and basal margins of head narrowly, basal half of 1st antennal joint, circular median spot on pronotum, base of rostrum and bases of femora yellow-brown. Under surface of prothorax whitish. Apterous ♀: as male but yellow-brown markings more spread: margins of head rather broadly, entire 1st antennal joint, base of 2nd antennal joint, transverse middle spot on pronotum, inverted V-shaped obscure middle spot on base of mesonotum, apex of abdomen, venter and femora, excluding tips, yellow-brown. Macropterous form: colouring as in the apterous form but ♀ with basal margin of pronotum yellow-brown.

Robust, apterous ♀ especially, broadly ovate, distinctly broader than the nominate form.

Male genitalia: Lateral horns of 10th sternite long and acute (Fig. 1).

Material studied: Ivory Coast: Bouaké, 1 ♂ holotype, 3 paratypes and 1 larva, 14.III.1964; Grand Bassam, Mangrove, 1 paratype and 2 larvae, 14.III.1964. Holotype and paratypes in the author's collection, paratypes also in collection Laboratory of Entomology, Wageningen.

Other material: Nigeria: N. Bussa, 3 ♀ possibly of this species, 12.I.1970, J. Medler, author's collection.

The new race differs from the others in the long and acute lateral horns of the 10th sternite (Fig. 1—3).

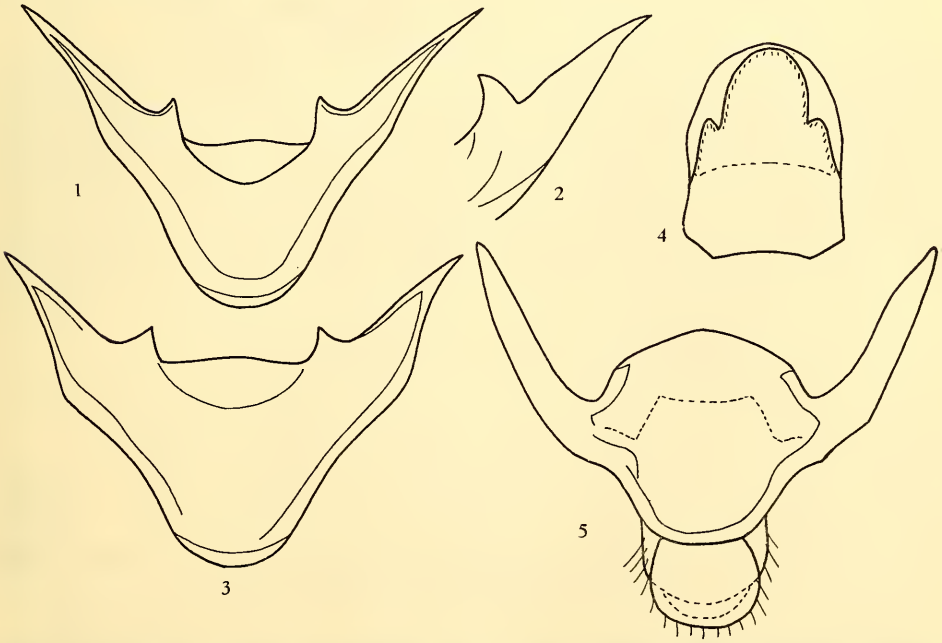

Fig. 1. *Naboandelus bergevini bouakeanus* subsp. n., 10th sternite. Fig. 2. *N. bergevini bergevini* Bgr. (Egypt), lateral horn. Fig. 3. *N. bergevini pygmaeus* Lv., 10th sternite. Fig. 4—5. *Hynesionella cobbeni* sp. n. 4, pygophore; 5, 10th sternite

Naboandelus bergevini bergevini Bgr. (Egypt, Libya) is black, the yellowish markings on the vertex and pronotum are very obscure, and the mesonotum, the antennae and the legs are always black, except the extreme base of the fore femora. The body is considerably narrow.

N. bergevini pygmaea Lv. (Sudan) is considerably smaller (length ♂ forma aptera 1.7—2 mm, ♀ forma aptera 2.4—2.5 mm, forma macroptera 3.75 mm) and narrower. The ground colouring is deep black. The pale markings are very scanty: the pale spots on the mesonotum are often absent, the hind legs are totally black and the fore and middle femora broadly blackened apically.

N. bergevini popovi Brw. (Israel, Arabia) resembles the new subspecies in the size, body form and general colouring, but differs in the dark hind legs and the shape of the 10th sternite (similar as in the nominate form). Moreover the pale spots on the mesonotum are generally not confluent medially. The macropterous form is considerably more robust.

Hynesionella cobbeni spec. nov. (Fig. 4—10)

Length ♂ 2 mm, ♀ 2.5—2.75 mm. Opaque. Black. Lateral margins of vertex brownish. Eyes reddish brown. Antennae black. Pronotum with yellow-brown median spot. Broad median band on mesonotum and base of dorsum of abdomen greyish blue. Also flanks with greyish blue markings. Legs black.

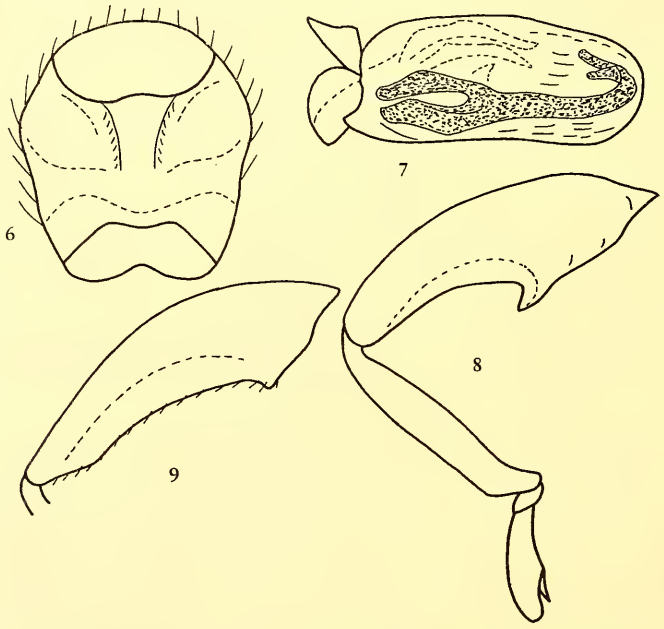

Fig. 6—9. *Hynesionella cobbeni* sp. n. 6, 8th abdominal segment, ventral aspect; 7, penis, lateral aspect; 8, fore leg (♂); 9, fore femur (♀)

Body short and robust (Fig. 10), about 1.7 times as long as broad. Hair-cover dense, adpressed, greyish. Ocular index 2.25—2.29. Antennae appearing short and relatively incrassate, 1st joint curved, 4th club-shaped, proportions of joints 25:23:18:20 (diatone

Fig. 10. *Hynesionella cobbeni* spec. nov.

45 units) in ♂, 26:20:18:21 (diatone 51 units = 0.015 mm) in ♀. Rostrum extending beyond fore coxae. Pronotum with anterior margin nearly straight, lateral margins short and strongly diverging caudad, basal margin nearly semicircular. Lateral margins of mesonotum distinctly curved, antero-lateral angles roundedly prominent, disk concave with a faint median keel, intersegmental suture between mesonotum and metanotum distinctly raised. Abdomen broadly conical, connexivum strongly reflexed. Legs appearing relatively short. Fore femur (Fig. 8—9) in ♂ incrassate with a strong tooth on caudal margin, in ♀ more slender, caudal margin with a small subbasal knob.

Measurements of legs (1 unit = 0.015 mm)

	♂			♀		
	femur	tibia	tarsus	femur	tibia	tarsus
fore	40	31	4 + 14	46	35	4 + 18
middle	80	126	80	100	148	95
hind	93	37	18	102	45	24

Male genitalia, Fig. 4—7.

Material studied: Ivory Coast: Adiopodoumé, 1 ♂ holotype, 2 ♀ paratypes, IV—V. 1964. Holotype and one paratype in author's collection, paratype in coll. of the Laboratory of Entomology, Wageningen.

The genus *Hynesionella* Ps. is closely related to *Naboandelus* Dist. differing mainly in the more robust body, the shorter extremities and the dentate anterior femora of the male (edentate in *H. omercooperi*). Two species of the genus have hitherto been described: *H. aethiopica* Ps. from Ethiopia and *H. omercooperi* Hf. & Mats. from South Africa. The latter is easily recognized by the edentate anterior femora. *H. aethiopica* is more robust, length 3 mm ♂, 3.25 ♀, the main colouring is bluish grey, the pronotum is longer and broader with the anterior margin curved and the lateral margins longer and less diverging caudad, the antennae are longer, the tooth of the anterior femora is smaller, etc.

The new species from the Ivory Coast is interesting from zoogeographical point of view because it indicates that the range of the genus is considerably larger than previously assumed.

Veliidae

Rhagovelia maculata Dist. — Adiopodoumé, 4 ex., IV—V.1964; Bouaké, 2 ex., 22—23.IV.1964. Widespread in tropical Africa.

Rhagovelia aeneipes Hgl. — Bouaké, several ex., 22—23.IV.1964. Known from West Africa, Congo, Sudan and S. Ethiopia.

Microvelia gracillima Rt. — Numerous ex. from Adiopodoumé. IV—V.1964 and Bouaké, 22—23.IV.1964. Nearly all Africa, Egypt, Israel, Madagascar.

Microvelia waelbrocki Kk. — Bouaké, 4 ex., 22—23.IV.1964; Lamto, 1 ex., 28.IV. 1964. Widespread in tropical Africa. Also known from Egypt.

Microvelia major Ps. — Bandama, 2 ex., IV.1964. Nearly all Africa, Arabia.

Microvelia (Trichovelia) pilipes spec. nov. (Fig. 11—18)

♂ forma aptera. Length 2 mm. Opaque. General colouring blackish brown. Head dark brown, margins slightly paler. Eyes reddish brown. Antennae dark brown. Pronotum coffee-brown, anterior margin with a transverse yellow-brown band. Connexivum dark yellow-brown, medio-basal angles of segments darkened. Lateral margins of venter and rostrum yellow-brown. Legs dark yellow-brown, femora pale ochraceous basally.

Small and narrow, 3.1 times as long as broad. Hair covering dense, longish, semidecumbent, brownish. Pronotum and dorsum of abdomen with patches of silvery adpressed pubescence. Head (Fig. 11) 0.75 times as broad as pronotum, convex, vertex with a faint median sulcus, ocular index 2.6. Antennae appearing long, 1st joint rather incrassate and recurved, with a few long erect setae, hair covering of antennae otherwise smooth; proportions between joints 23:17:2:16:25 (diatone 30 units). Pronotum 1.74 times as broad as long, lateral margins curved, hind margin truncate; disk flattish with a faint transverse impression at middle, puncturing rather sparse and obsolete. Meso- and metanotum visible as small triangular lateral lobes. Abdomen narrowly conical, connexivum distinctly upcurved. Fore legs (Fig. 12): femur rather incrassate, hair covering short; tibia broadening apicad, inner surface with remarkably long hairs, obliquely directed latero-apicad, hair covering of other parts of the common type, comb short, 0.31 times as long as tibia. Middle legs of the common type, hair covering short. Hind legs (Fig. 13): femur moderately incrassate, slightly curved apically, hair covering short; tibia distinctly reflexed owing to a roundish subbasal expansion on inner margin,

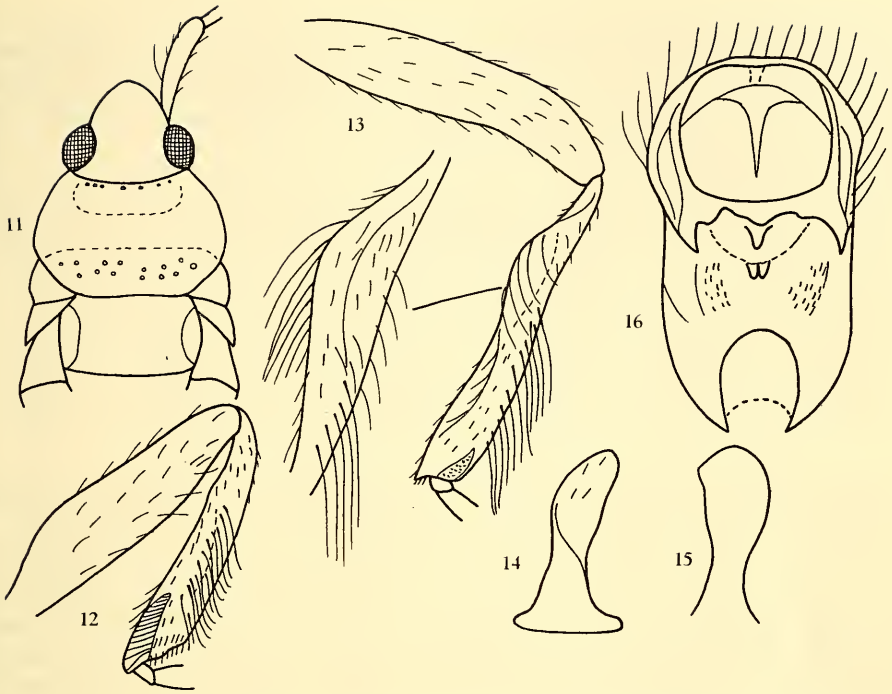

Fig 11—16. *Microvelia pilipes* sp. n. 11, head and thorax; 12, fore leg (♂); 13, hind leg (♂); 14—15, styli; 16, 8th abdominal segment (♂), ventral aspect

Measurements of legs (1 unit = 0.015 mm)

	femur	tibia	tarsus
fore	35	32 (comb 10)	16
middle	40	40	7 + 16
hind	42	50	7 + 16

apical part of tibia flattened, expansion and apical part of outer margin with numerous very long hairs, hair-cover otherwise short.

Male genitalia, Fig. 14—18. Ventral surface of 8th abdominal segment medially concave and provided with 3 tubercles. Styli very small.

♀ forma aptera. Length 2.3—2.7 mm. Resembling ♂. Head yellowish brown, median sulcus and a longitudinal dash on either side of vertex dark fuscous.

Hair-cover longer than in ♂. Head about 0.83 times as broad as pronotum; ocular index about 1.78. Proportions of antennal joints 24:17:2:18:25 (diatone 34 units), 1st joint rather incrassate and recurved, with a few long bristles, hair covering of antennae otherwise semidecumbent, longer than in ♂, longest hairs of 3rd joint longer than diameter of the joint. Pronotum about 1.7 times as broad as long at middle, puncturing dark and coarser than in ♂. Sides of abdomen strongly erected dorso-mesad, touching or nearly touching each other medially, dorsum therefore concealed, excluding a narrow midline, from 3rd tergite to tip of abdomen. Apex of abdomen obliquely vertical in

profile (as in *M. troilos*); hair covering of connexivum of normal type. Legs incrassate, hair covering semidecumbent, longish, dense. Fore and middle femora slightly curved, tibiae straight. Fore tibiae thick, expanding apicad, hair covering normal. Hind femora shallowly curved; tibiae a little reflexed, outer margin with longish erect hairs, hair covering otherwise semidecumbent or smooth.

Measurements of legs (1 unit = 0.015 mm)

	femur	tibia	tarsus
fore	37	33	18
middle	45	44	7 + 18
hind	47	54	8 + 19

Material studied: Bouaké, IV.1964. 1 ♂ holotype and 3 ♀ paratypes in author's collection, 1 ♂ and 5 ♀ in coll. of the Laboratory of Entomology, Wageningen.

A distinctive species. Of the subgenus *Trichovelia* Hob., recognized by the long hair-cover and the structure of the hind legs, two species are known, *M. machadoi* Hob. from Angola and *M. urundii* Ps. from Urundi (= Burundi). *M. machadoi* is distinguished by the long hair-cover of the antennae, the long comb of the fore tibiae and the structure of the male genitalia. *M. urundii* is bigger, length 3.3 mm, the antennae are provided with long erect hairs.

Microvelia (Trichovelia) troilos spec. nov. (Fig. 19—25)

Fig. 19. Forma aptera. Length ♂ 1.6—2.0 mm, ♀ 2.75 mm. Head yellow-brown, tylus brown, frons often with a brown midline, eyes reddish grey. Antennae blackish. Pronotum yellow-brown, basal part usually slightly embrowned and provided with a pale midline, puncturing black. Lateral lobes of meso- and metanotum yellow-brown, transverse segmental margins weakly embrowned. Dorsum of abdomen dark brown, 1st tergite with a faint pale midline, last tergite yellowish brown. Connexivum yellowish brown, transverse segmental margins embrowned. Under surface blackish, segmental margins of thorax pale, lateral margins of venter yellowish brown. Base of rostrum pale, apex black. Legs dark coffee-brown, coxae and bases of femora pale.

Body robust as in *M. major* Ps., 2.3—2.7 times as long as broad. Head convex, with a faint median sulcus, hair covering semidecumbent, brownish; ocular index 3.3—3.8. Antennae appearing relatively short and thick, especially in ♂, 1st joint distinctly curved, with a few long erect bristles, 2nd joint slightly expanding apicad, hair covering semidecumbent; proportions between joints 18:13:2:13:19 (diatone 30.5 units) in ♂, 25:19:2:18:24 (diatone 38.5 units) in ♀. Pronotum 1.4 (♂) or 1.6 (♀) times as broad as long, lateral margins curved, apical margin shallowly insinuated, basal margin roundedly truncate; puncturing remarkably coarse and sparse, callal area and a midline on disk impunctate; hair covering on lateral areas long, erect and dark, on median parts short and smooth, callal area with silvery pubescence. Meso- and metanotum visible as triangular lateral lobes, hair covering smooth and partly silvery, also long erect dark hairs present. Abdomen rather broadly conical, connexivum in ♂ moderately,

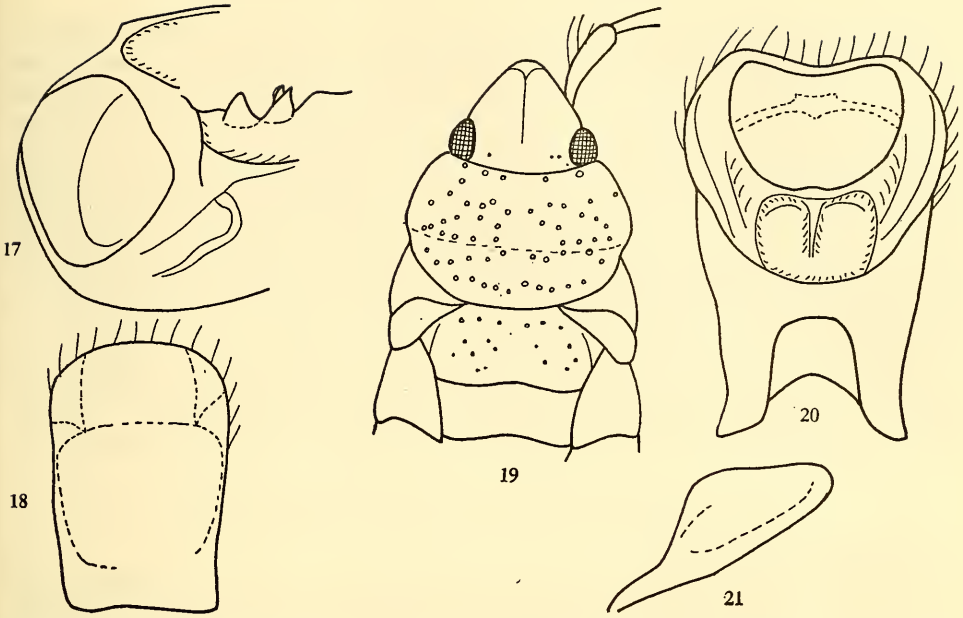

Fig. 17—18. *Microvelia pilipes* sp. n. 17, 8th abdominal segment (♂), obliquely from side; 18, genital capsule (♂) from below. Fig. 19—21. *M. troilos* sp. n. 19, head and thorax; 20, 8th abdominal segment (♂), ventral aspect; 21, stylus

in ♀ strongly upcurved; 1st tergite with a few coarse punctures; hair-cover short, adpressed and brownish, silvery pubescence abundant. Hair-cover of under surface adpressed, coarsely punctate margins of prothorax with long erect black hairs. Legs incrassate, hair covering semidecumbent, dense. Fore tibia (♂) (Fig. 22) straight, comb 0.53 × as long as tibia. Hind tibia (♂) straight.

Measurements of legs (1 unit = 0.015 mm)

	♂			♀		
	femur	tibia	tarsus	femur	tibia	tarsus
fore	33	30 (comb 16)	17	45	41	24
middle	37	38	7 + 15	52	54	9 + 21
hind	40	46	8 + 15	58	65	11 + 21

Male genitalia, Fig. 20—21, 23—24. Ventral surface of 8th abdominal segment with a roundish median depression. Styli small. Apex of abdomen (♀) (Fig. 25) obliquely vertical in profile.

♀ forma macroptera. Length 2.75 mm. General colouring as in the apterous form. Pronotum bicoloured: dark brown with anterior margin and a narrow, basally indistinct midline, yellowish brown, also lateral margins narrowly pale. Elytra black, corium with two milky basal spots, the lateral one large (pattern as in *M. urundii* Poisson, 1955, p. 396, Fig. 2B), membrane uniformly dark.

Body short and broad, 2.2 times as long as broad, broadest at humeral angles of pronotum, distinctly tapering caudad. Head 0.51 times as broad as pronotum; ocular index 3.0. Pronotum 1.2 times as broad as long at middle, lateral margins straight, strongly diverging caudad, humeral angles blunt, caudal prolongation broadly parabolic; disk moderately convex, sloping both apicad and caudad, the pale areas impunctate, puncturing otherwise fine and relatively sparse, distance between punctures distinctly longer than diameter of a puncture; anterior margin with a puncture; anterior margin with a puncture row, interrupted at middle. Elytra a little shorter and narrower than abdomen, tip of abdomen and lateral margins of connexivum therefore visible (as e.g. in *M. major* Ps. (= *tchanialis* Ps.) in Poisson, 1941, p. 185, Fig. 31). Puncturing of under surface of thorax rather fine. Other characters as in the apterous form.

Material studied: Bouaké, 1 apterous ♂ holotype and 18 apterous ♂, 19 apterous ♀ and 2 macropterous ♀ paratypes, IV.1964. Holotype and paratypes in author's collection, paratypes also in coll. of the Laboratory of Entomology, Wageningen.

KEY TO THE SPECIES OF THE SUBGENUS *Trichovelia* HOB.

1 (6) Apterous forms 2
2 (5) ♂: Hind tibiae reflexed, inner surface with a subbasal roundish expansion with a tuft of very long hairs. ♀: Sides of abdomen strongly upcurved, concealing dorsum of abdomen, at least apically 3
3 (4) Only 1st antennal joint with long erect bristles. ♂: Length 2 mm. Comb of fore tibiae short, only 0.31 times as long as tibia. ♀: The upcurved lateral margins of abdomen concealing dorsum from 3rd tergite to tip of abdomen; hair covering of paratergites normal . . . . . *pilipes* sp.n.
4 (3) All antennal joints with long erect bristles. ♂: Length 2.28 mm. Comb of fore tibiae slightly shorter than half of tibial length. ♀: Upcurved lateral margins of abdomen concealing dorsum only apically from tergite 5 to tip of abdomen; 6th paratergite with a tuft of long erect bristles . . *machadoi* Hob. (Angola)
5 (2) ♂: Hind tibiae straight, without a tuft of long hairs. ♀: Sides of abdomen only moderately upcurved . . . . . *troilos* sp.n.
6 (1) Macropterous forms (♀) 7
7 (8) Length 3.3 mm. Body about 2.5 times as long as broad. Pronotum black, only humeral angles reddish . . . . . *urundii* Ps. (Urundi)
8 (7) Length 2.75 mm. Body 2.2 times as broad as long. Pronotum more largely bicoloured . . . . . *troilos* sp.n.

Mesoveliidae

Mesovelia vittigera Hv. — Adiopodoumé, 1 ex., IV—V.1964; Bouaké, several ex., 22—23.IV.1964. Paleotropical.

Mesovelia dentiventris Lv. mollis subspec. nov. (Fig. 26—27)

Forma aptera. Length ♂ 3.75—4 mm, ♀ 4.25—4.5 mm. Resembling the nominate form from the Sudan but paler: yellow-brown; apex of head dark; antennae and legs with faint infuscation; tarsi bicoloured with 1st joint pale and 2nd dark. The nominate form is darker yellowish brown with the antennae and legs dark brown. The tarsi are dark with the 1st joint only indistinctly pale.

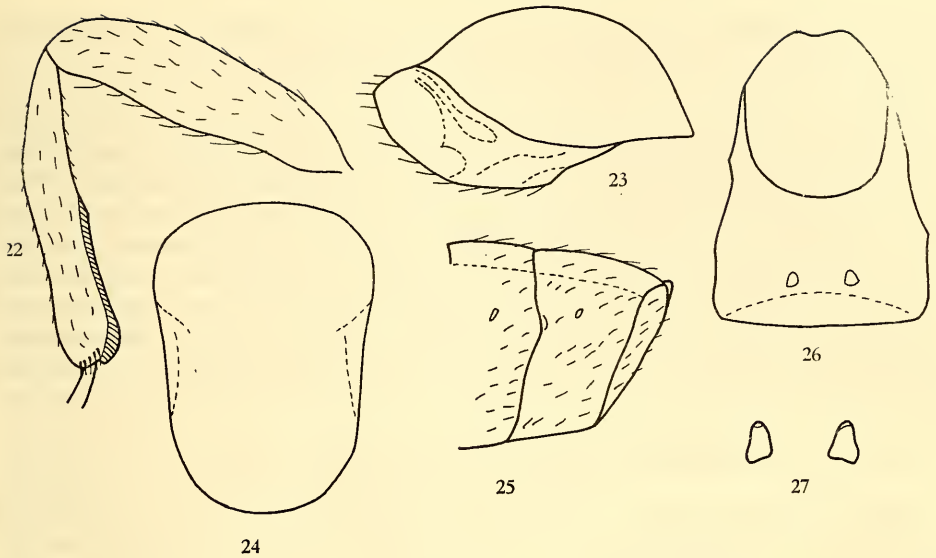

Fig. 22—25. *Microvelia troilos* sp. n. 22, fore leg (♂); 23, 8th abdominal segment (♂) from side; 24, genital capsule (♂) from below; 25, apex of abdomen (♀) in profile. Fig. 26—27. *Mesovelia dentiventris*. 26, *M. d. mollis* subsp. n., 8th abdominal segment (♂), ventral aspect; 27, *M. d. dentiventris* Lv., tubercles of 8th abdominal segment (♂)

Body more gracile than in the nominate form. Teeth on ventral surface of 8th abdominal segment (Fig. 26—27) much smaller.

Measurements (1 unit = 0.015 mm)

Proportions between antennal joints 21:15:21:21 (diatone 18.5) in ♂, 20:15:21:21 (diatone 18.5) in ♀.

	♂			♀		
	femur	tibia	tarsus	femur	tibia	tarsus
fore	31	24	4 + 4	30	23	4 + 4
middle	40	37	7 + 5	40	38	8 + 6
hind	50	65	10 + 6	50	67	10 + 6

Material studied: Ivory Coast: Boaké, 1 ♂, holotype and 3 paratypes, IV.1964. Holotype in author's collection, paratypes in coll. of the Laboratory of Entomology, Wageningen.

Hydrometridae

Hydrometra aegyptia chabanaudi Hf. & Ev. — Port Bonet, 1 ex., 14.IV.1964. Range: Sudan.

Hydrometra albolineolata Rt. — Adiopodoumé, 2 ex., IV—V.1964; Bouaké, 3 ex., 22—23.IV.1964; Lamto, 1 ex., 20.IV.1964. All Africa S. of the Sahara.

Hydrometra chopardi Ps. — Adiopodoumé, 1 ex., IV—V.1964. Guinean.

Hydrometra rhodesiana Hf. & Ev. — Lamto, 1 ex., 28.IV.1964. Known from West Africa, the Sudan and East Africa (Rhodesia).

2. A NEW SPECIES OF THE GENUS *Hebrovelia* LBL. (HET. VELIIDAE, HEBROVELIINAE) FROM THE CENTRAL AFRICAN REPUBLIC

The genus *Hebrovelia* was described by Lundblad (1939), who regarded it as a representative of a new family, Hebroveliidae, differing from the closely related Veliidae in the apical claws (preapical in Veliidae). Later on, China & Usinger (1948) stated that also certain Veliidae genera have apical claws, and that Hebroveliidae undoubtedly are a subfamily of that family. The subfamily, which has an isolated position within Veliidae, has a Guinean range. The following species and races have hitherto been described: *H. singularis* Lbl. (Nigeria), *H. usingeri usingeri* Ps. (Cameroon), *H. usingeri congoensis* Ps. (Zaire) and *H. usingeri collarti* Ps. (Zaire and Congo (Brazzaville)). An additional species, *H. carayoni* from the Central African Republic, is described below.

Hebrovelia carayoni spec. nov. (Fig. 28—36)

Forma microptera. Length 4.25 mm. Opaque. Reddish brown. Tylus shiny, apex and sides of frons yellowish brown, vertex with two very small black pits. Eyes reddish brown. Antennae dark yellow-brown. Margins of pronotum rather broadly yellowish brown, puncturing black. Elytral rudiments whitish. Dorsum of abdomen with a broken midline of yellowish brown spots, each paratergite with a triangular pale spot, puncturing dark. Rostrum yellow-brown, tip black. Sides of thorax largely black. Venter with a broad black longitudinal band on either side, also the punctured areas at middle of sternites rather darkened. Legs yellow-brown. A ring and extreme tip of femora brown.

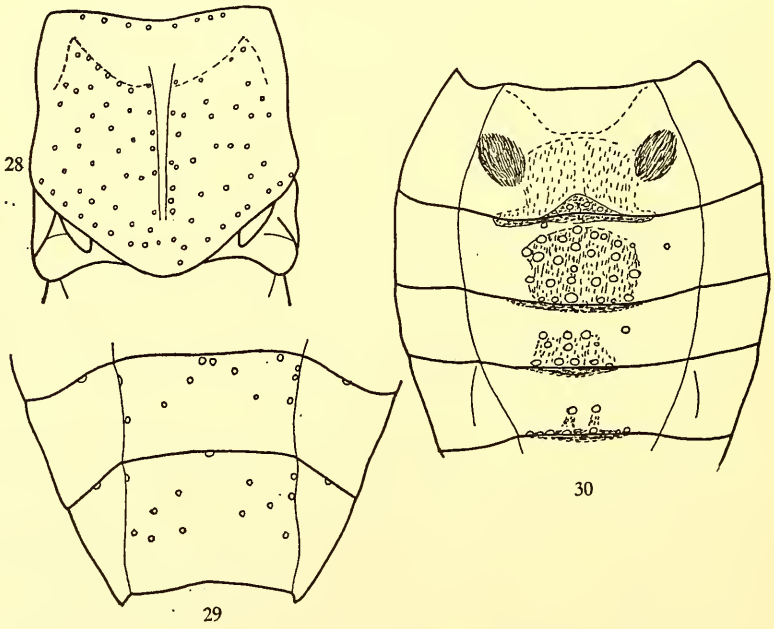

Fig. 28—30. *Hebrovelia carayoni* sp. n. 28, thorax; 29, last tergites; 30, venter

Of the common shape of the genus but remarkably gracile, body 3.4 times as long as broad. Hair-cover on upper surface dense, adpressed, brownish and relatively short, on under surface longish. Head slightly broader than pronotum (73: 71), convex, sloping both apicad and basad, with 3 small trichobothria and a round black pit on either side, a narrow median sulcus present. Proportions between antennal joints 25:21:(4):48:(2):45, 1st joint distinctly curved, provided with adpressed hairs and a few longish bristles, hair covering of 2nd joint adpressed, other joints with long erect bristles. Pronotum (Fig. 28) broader than long at middle (71:65), nearly parallel-sided, hind margin semicircular, callal area and middle of basal part slightly elevated, a relatively distinct median keel present; puncturing sparse and rather fine, callal area and lateral margins impunctate. Elytral rudiments very small, scale-like. Tergites (Fig. 29) with only scattered and small punctures, in one specimen the punctures forming irregular transverse rows; paratergites with 1—2 punctures. Sides of thorax rather densely punctate. Middle of venter (Fig. 30) depressed, structure otherwise as mentioned in the following table, the black lateral bands with coarse puncturing, parasternites impunctate. Legs (Fig. 35—36) of the common type in the genus.

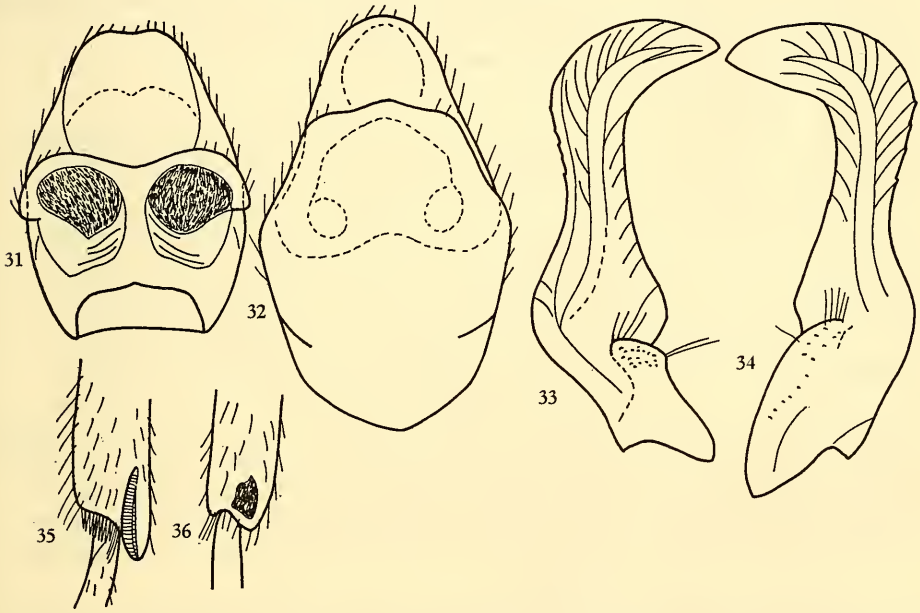

Fig. 31—36. *Hebrovelia carayoni* sp. n. 31, 8th abdominal segment, ventral aspect; 32, genital capsule and anal conus, ventral aspect; 33—34, stylus; 35, apex of fore tibia; 36, apex of hind tibia

Measurements of legs (1 unit = 0.015 mm)

	femur	tibia	tarsus
fore	76	67 (comb 10)	31
middle	88	85	22 + 18
hind	103	108 (brush 6)	38 + 26

Male genitalia, Fig. 31—34.

Material studied: Central African Republic: Boukoko, grotte de Bébé, 1 ♂, holotype, in the Paris Museum, and 3 ♂ paratypes, in author's collection, VI.1964, J. Carayon.

The main distinguishing characters of the species are indicated in the following table.

singularis	*usingeri*	*carayoni*
1. macropterous	1. usually macropterous	1. brachypterous
2. puncturing of dorsum very dense and coarse, also paratergites with several punctures (Lundblad, 1939, Pl. 2 Fig. 3)	2. puncturing of dorsum finer and rather abundant, paratergites often with 4 punctures.	2. puncturing of dorsum very remote, paratergites with 1—2 punctures.
3. depressed median part of venter: 7th sternite: black setigerous tufts very small lying in caudal margin (Poisson, 1950, Fig. 10)	3. 7th sternite: black setigerous tufts large, less compact (Poisson, 1950, Fig. 9, 11 and 12)	3. 7th sternite: black setigerous tufts of moderate size, compact.
6th sternite: with remote puncturing.	6th sternite: 3—4 small punctures at middle.	6th sternite: coarsely and densely punctate and darkened at middle.
5th sternite: puncturing remote	5th sternite: 1 puncture at middle	5th sternite: with several punctures at middle
4th sternite: ?	4th sternite: impunctate at middle	4th sternite: with 2 punctures at middle.
3rd sternite: ?	3rd sternite: with about 6 remote punctures.	3rd sternite: impunctate.
4. 8th abdominal segment: narrowly conical, setigerous brushes of moderate size (Lundblad, 1939, Fig. 2 g).	4. 8th abdominal segment: narrowly conical, black setigerous brushes very large (Poisson, 1950, Fig. 9e, 11 c and 12d).	4. 8th abdominal segment: broader, apical margin slightly insinuated, black setigerous brushes largish.
5. Apex of stylus weakly recurved, blunt (Lundblad, 1939, Fig. 2k).	5. Stylus as in *H. singularis*.	5. Apex of stylus strongly recurved and rather sharp.

3. ON THE GENUS *Daladeropsis* KARSCH (COREIDAE, COREINAE, DALADERINI)

Of the Guinean genus *Daladeropsis* Karsch three species are known: *D. africanus* (Dl.), widespread within the Guinean subregion, and *D. hutereauae* Scht. and *D. dispar* Scht. in central southern Zaire. In material of various Heteroptera from the Central African Republic, sent by Dr. M. Boulard, of Paris, a new species, *D. pelops*, was detected.

D. africana and *D. pelops* are close relatives having large wing-shaped humeral lobes of the pronotum and a strongly expanded, nearly circular abdomen. They represent so the basic type of the tribe *Daladerini,* the centre of origin of which is in the Oriental region, apparently in S.E. Asia. In the two southern species, *D. hutereauae* and *D. dispar,* a tendency to reduction of the humeral lobes and narrowing of the abdomen is seen. Both species are without doubt derivatives of the *africana* stock; *D. hutereauae* has even retained certain *africana* features like the distinct tuberculation and the insinuated lateral margins of the pronotum.

Key to the species

1 (4) Humeral lobes of pronotum (Fig. 60, 65) directed laterad nearly horizontal, blunt. Antennae and legs appearing short, 1st antennal joint about 1.5 times as long as diatone. Abdomen elongately ovate. Small species, length < 30 mm 2

2 (3) Humeral lobes of pronotum (Fig. 60) dark, wing-shaped, lateral margins distinctly insinuated in front of them, remotely and coarsely dentate. 3rd antennal joint (Fig. 62—63) distinctly clavate. Medioventral process of pygophore (Fig. 68) broad and straight. Stylus (Fig. 69) broad . . . . . *hutereauae* Scht.

3 (2) Humeral lobes of pronotum (Fig. 65) not darkened, roundedly triangular, lateral margins in front of them straight, finely serrate. 3rd antennal joint (Fig. 64) narrow. Medio-ventral process of pygophore (Fig. 66) digitate, recurved caudad. Stylus (Fig. 67) narrow. . . . . *dispar* Scht.

4 (1) Humeral lobes of pronotum (Fig. 37, 40, 45, 55) prominent, wing-shaped, ± upcurved, distinctly recurved apicad. Antennae and legs long, 1st joint about twice as long as diatone. Abdomen strongly expanded, nearly circular in outline. Large species, length about 30 mm or more 5

5 (6) Length 33 mm. Humeral lobes of pronotum (Fig. 53) rather small, body appearing therefore narrowish. 1st antennal joint 1.25 times as long as 2nd. Hind femur (Fig. 51) incrassate, 5 × as long as broad, hind tibia much shorter than femur (51:61). Pygophore (Fig. 53) narrowish, apical margin rounded, medio-ventral process (Fig. 48) very short and broad . . . . *pelops* sp.n.

6 (5) Length about 30 mm. Humeral lobes of pronotum (Fig. 37, 40, 45) more prominent, body appearing broad. 1st antennal joint only slightly longer than 2nd. Hind femur (Fig. 49—50) somewhat slenderer, tibia longer. Pygophore (Fig. 52) broad, truncate apically; medioventral process (Fig. 46—47) long, triangular . . . . . *africana* (Dl.)

Daladeropsis africana (Dl.) (Fig. 37—47, 49—50, 52, 56—57)

This widespread species seems to consist of two races distinguished as follows:

africana africana	*africana ampliata* ssp.n.
1. head (Fig. 38) in ♀ parallel sided in front of eyes, antennal tubercles large.	1. head (Fig. 39) in ♀ tapering apicad, antennal tubercles smaller.
2. 3rd antennal joint (Fig. 43—44) longer, moderately flattened, upper margin in narrow aspect subacute.	2. 3rd antennal joint (Fig. 41—42) shorter and strongly flattened, distinctly clavate, upper margin in narrow aspect sharp and shiny.

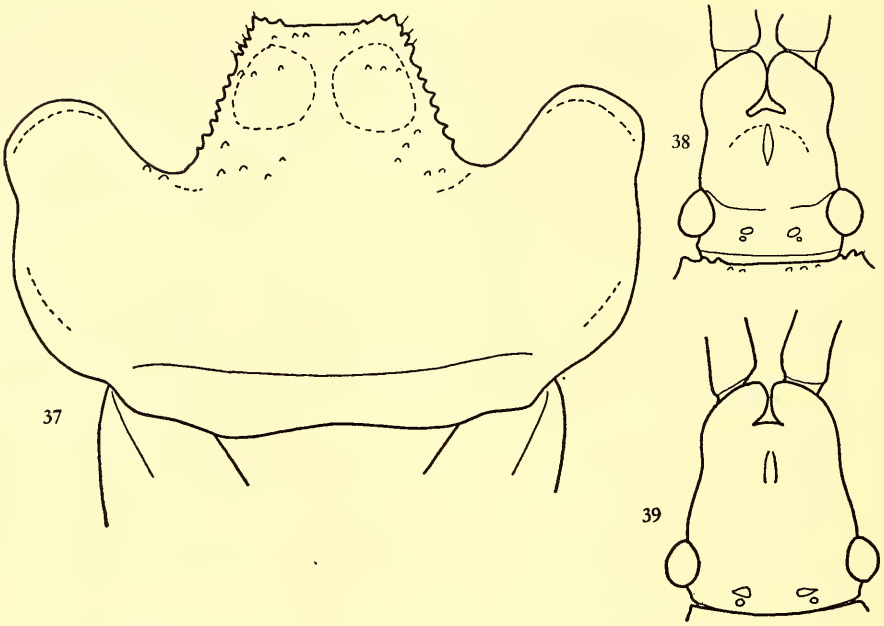

Fig. 37—38. *Daladeropsis a. africana* (Dl.), type ♀. 37, pronotum; 38, head. Fig. 39. *D. africana ampliata* subsp. n., head (♀)

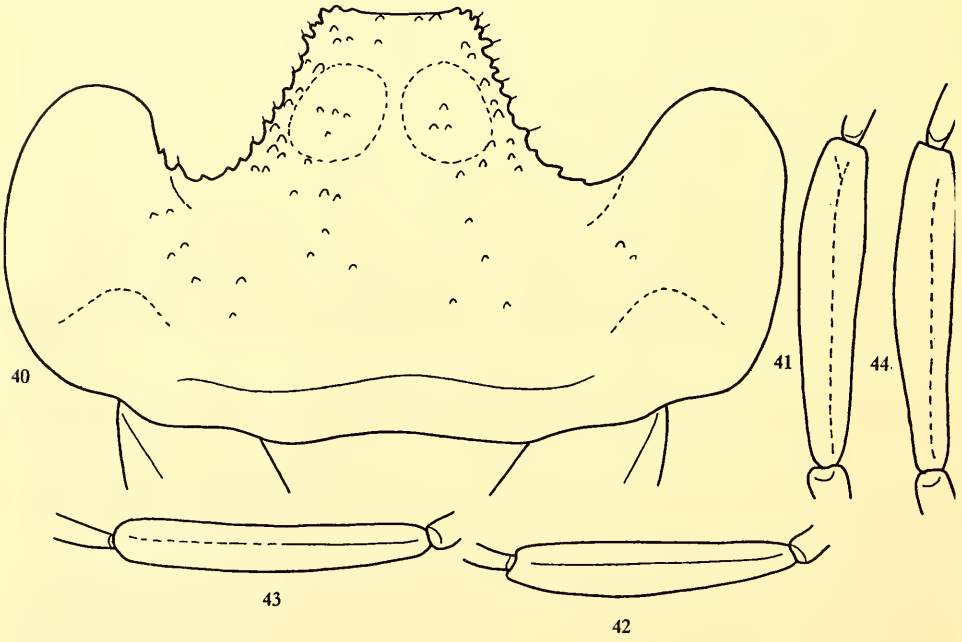

Fig. 40—42. *Daladeropsis africana ampliata* subsp. n. 40, pronotum (♀); 41, 3rd antennal joint (♀); 42, same (♂). Fig. 43—44. *D. africana africana* (Dl.) (Cameroon). 43, 3rd antennal joint (♂); 44, the same (♀)

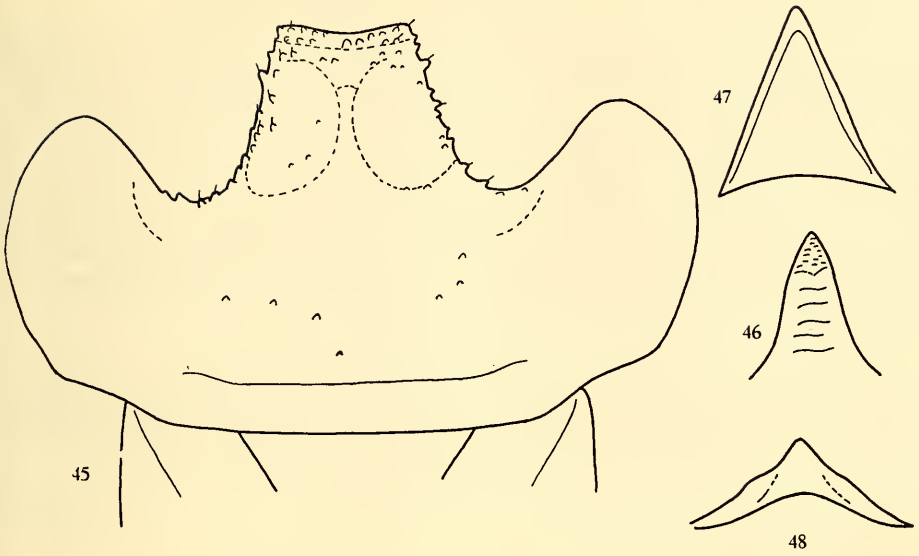

Fig. 45—47. *Daladeropsis africana*. 45—46, *D. a. ampliata* subsp. n.; 45, pronotum; 46, medio-ventral process of pygophore; 47, *D. a. africana* (Dl.) (Cameroon), medio-ventral process of pygophore. Fig. 48. *D. pelops* sp. n., the same

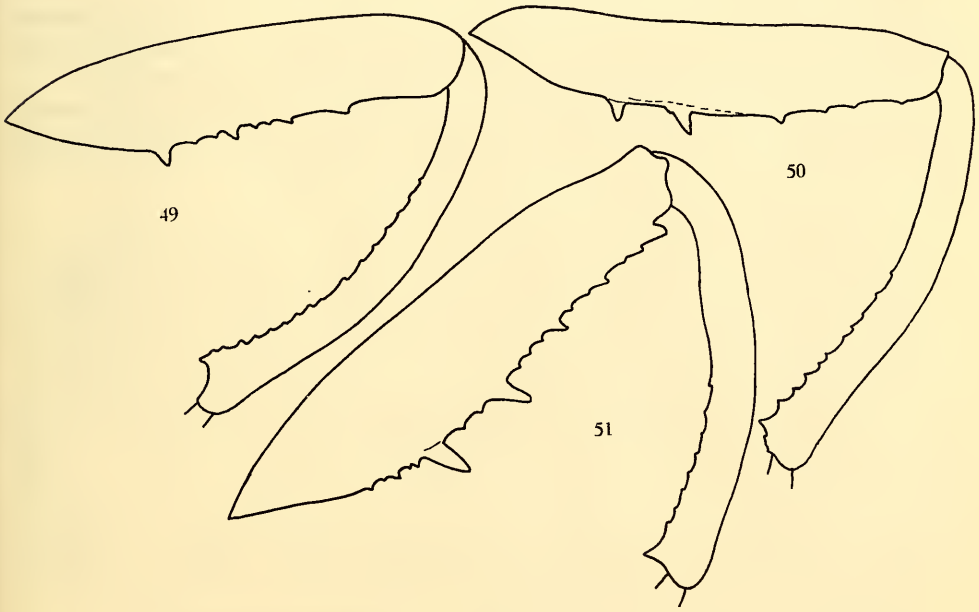

Fig. 49—51. Hind legs of ♂. 49, *Daladeropsis africana africana* (Dl.) (Cameroon); 50, *D. africana ampliata* subsp. n.; 51, *D. pelops* sp. n.

(*africana africana*)	(*africana ampliata*)
3. humeral lobes of pronotum (Fig. 37) generally rather weakly produced, approaching in shape to that of *D. pelops*.	3. humeral lobes of pronotum (Figs. 40, 45) generally strongly produced, wing-shaped.
4. tuberculation of venter rather weak and nearly concolorous.	4. tuberculation of venter coarse and ± dark.
5. hind tibia distinctly shorter than femur; hind femur in ♂ thicker (Fig. 49), tuberculation on posterior surface weaker.	5. hind tibia nearly as long as femur; hind femur in ♂ (Fig. 50) thinner, tuberculation on posterior surface stronger.
6. puncturing on ventral surface of pygophore rather sparse; medio-ventral process (Fig. 47) broad, triangular.	6. puncturing on ventral surface of pygophore very dense, rather confluent; medio-ventral process (Fig. 46) narrower.
7. range: northern coastal area of the Bay of Guinea.	7. range: Congo.

Both races seem to be connected by intermediates: in one female from Joko, Cameroon, the humeral lobes of the pronotum are fairly prominent, while in a female from Kafakumba, Katanga, they are as short as in the nominate form.

Material studied:

D. africana africana (Dl.): Sierra Leone, 1 ♀, holotype, in the British Museum; Cameroon: Joko, S. Cameroon, 2 ♀, A. Heyne, and Victoria, 1 ♂, in Mus. Leiden. In Mus. Leiden there is also a female with an incorrect locality label "Java".

D. africana ampliata ssp.n.: Zaire, Meshe, 1 ♂, holotype, 2—4.VI.1949, R. Laurent; Lulua, Kapanga, 1 ♀ paratype, X.1939, F. Overlaet, in the author's collection; Katanga, Kafakumba, 1 ♀ paratype, I.1924, E. le Moult, Mus. Leiden.

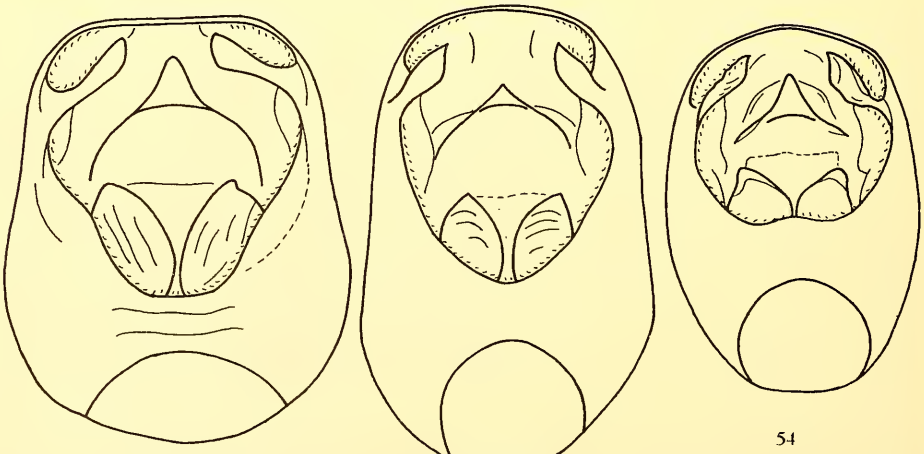

Fig. 52—54. Pygophore (♂). 52, *Daladeropsis africana ampliata* subsp. n.; 53. *D. pelops* sp. n.; 54, *D. hutereauae* Scht. (type)

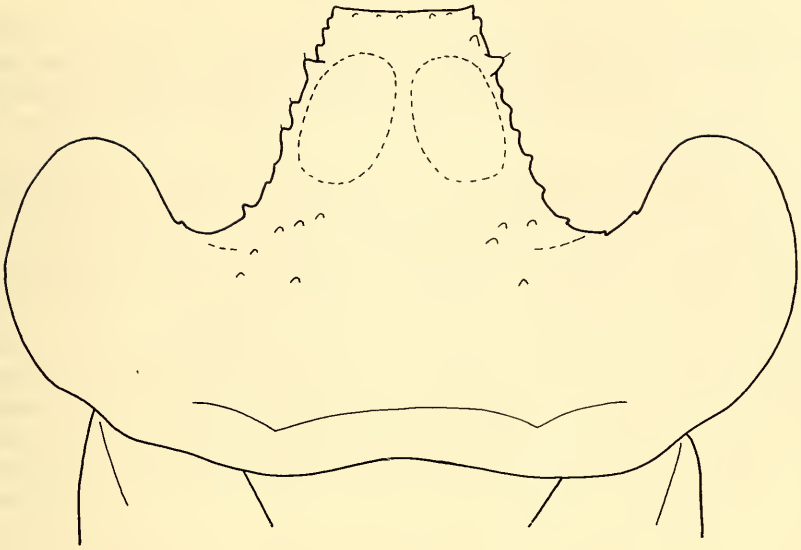

Fig. 55. *Daladeropsis pelops* sp. n., pronotum

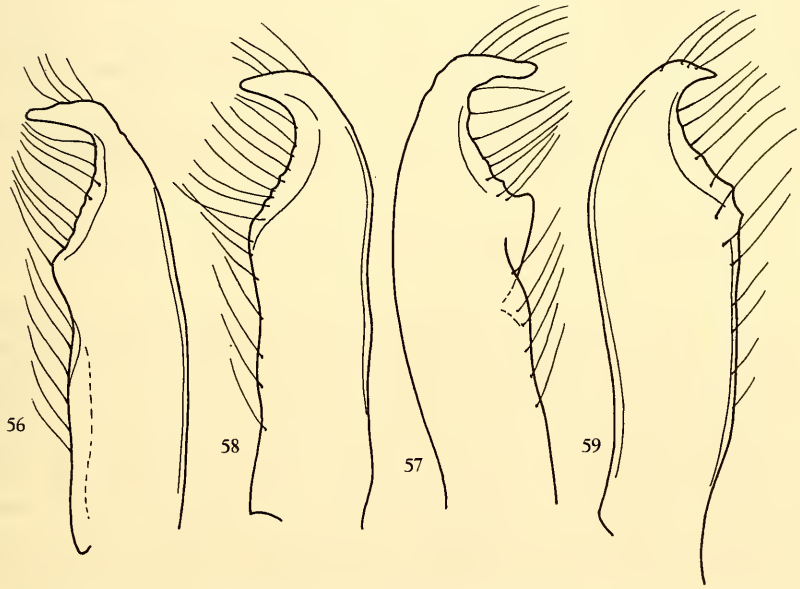

Fig. 56—59. Styli. 56—57, *Daladeropsis africana ampliata* subsp. n., 58—59, *D. pelops* sp. n.

Daladeropsis pelops spec. nov. (Fig. 48, 51, 53, 55, 58—59)

Length 33 mm, greatest breadth 17 mm. Subopaque. Reddish brown. 1st and 2nd antennal joints (others absent) black. Tubercles on lateral margins of pronotum rather contrastingly whitish, humeral lobes and a faint midline on posterior part of disk

blackish. Corium with a minute pale apical dot. Dorsum of abdomen pink, connexivum reddish brown with extreme lateral margin black. Rostrum black. Pronotum medially and laterally darkened. Meso- and metathorax with minute brown puncturing. Tubercles on venter mainly pale. Legs reddish brown, with a rather distinct dark irroration, tibiae appearing rather pale.

The largest species of the genus. Hair covering short, yellowish. Anterior part of head moderately constricted at middle; antennal tubercles fairly large; tuberculation rather remote; ocular index 3.7. Proportions between antennal joints 35:28?, 1st joint 1.25 times as long as 2nd. Rostrum extending beyond fore coxae. Pronotum appearing narrow owing to the fairly weakly produced humeral lobes (Fig. 55), 1.4 times as broad as long, 0.7 times as broad as greatest breadth of abdomen; lateral margins of anterior part insinuated, coarsely tuberculate; calli slightly raised and, like the rest of the anterior part, rugose and tuberculate; posterior part of disk densely transversely rugose, minutely punctate and provided with a few pale tubercles, a transverse ridge in front of basal margin. Scutellum minutely punctate and rugose. Elytra finely punctate. Abdomen strongly expanded, roundedly ovate in outline. Connexivum indistinctly punctate. Under surface of thorax minutely tuberculate and punctate. Venter rugose, tuberculation rather indistinct. Legs appearing short and incrassate. Under surface of fore and middle femora with two rows of coarse teeth, the corresponding tibiae roughly dentate on under surface. Hind femur (Fig. 51) 5 times as long as broad, hind margin with two large subbasal teeth, apical part with 3 small teeth and minute tubercles; tibia distinctly shorter than femur (51:61), minutely dentate.

Male genitalia: Pygophore (Fig. 53) narrow, rounded apically, ventral surface finely punctate; medio-ventral process (Fig. 48) very short and broad. Stylus (Fig. 58—59) broad, apex rather weakly recurved.

Material studied: Central African Republic: Boukoko, 1 ♂, holotype, 7.X.1966, M. Boulard, author's collection. The specimen was found on *Theobroma cacao*.

Daladeropsis hutereauae Scht. (Fig. 54, 60—63, 68—69)

Length ♂ 25—28 mm, ♀ 24 mm. Colouring as in *D. africana*. Readily distinguished from *D. africana* and *D. pelops* by the smaller size, the narrower body, the shorter and nearly horizontal humeral lobes of the pronotum, the much narrower ovate abdomen and the shorter extremities.

Head tapering apicad. Proportions between antennal joints 24:23:21:19 (♂ holotype) or 19:19:20:14 (♀), 1st joint 1.4—1.5 times as long as diatone, 2nd distinctly flattened, 3rd clavate (Fig. 62—63). Humeral lobes of pronotum (Fig. 60) roundedly produced laterad, only slightly upcurved, lateral margins in front of them distinctly insinuated, coarsely dentate. Tuberculation of venter minute, remote and concolorous. Hind femora (Fig. 61) in both sexes gracile, a little longer than tibiae (50:41 in ♂, 41:38 in ♀).

Male genitalia: Pygophore (Fig. 54) ovate in outline; medio-ventral process (Fig. 68) dark, narrowly triangular, straight. Stylus robust (Fig. 69).

Material studied: Zaire: Adrangu, 1 ♂, 1912, Hutereau; Katanga, Lukafu, 1 ♂, 6—22.XII.1930, G. F. de Witte; Uele, Tukpwo, 1 ♀, IX.1937, L. Leconto, in Mus. Tervuren.

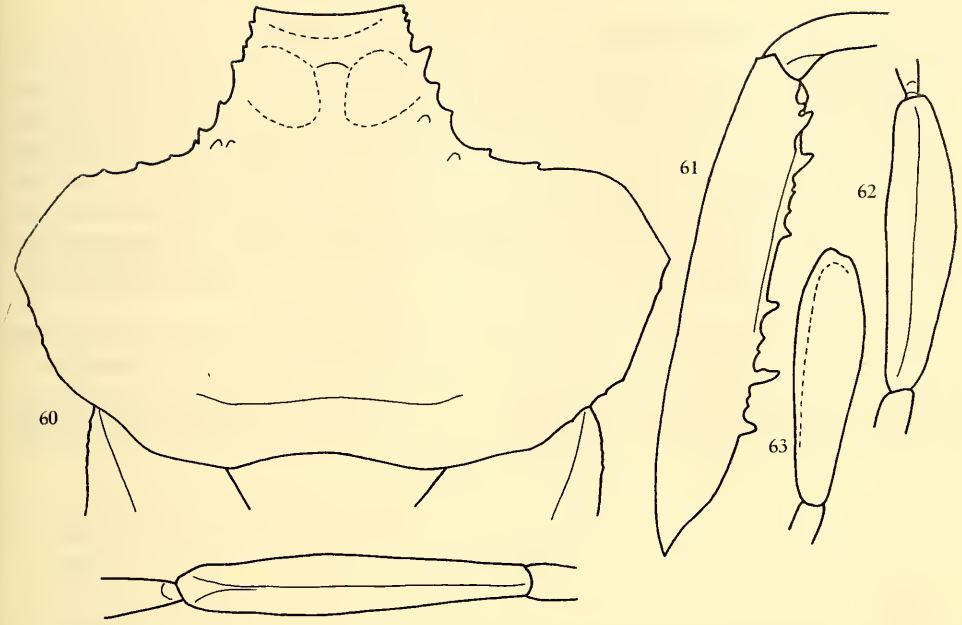

Fig. 60—63. *Daladeropsis hutereauae* Scht. (type). 60, pronotum; 61, hind femur; 62, 3rd antennal joint (♂); 63, the same (♀). Fig. 64. *D. dispar* Scht., 3rd antennal joint (♂)

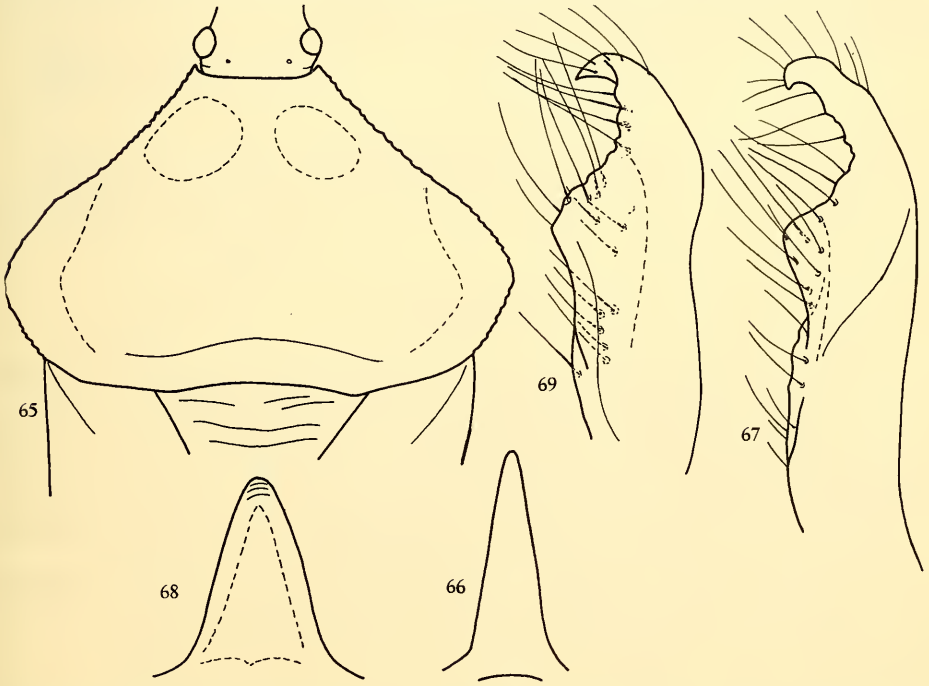

Fig. 65—67. *Daladeropsis dispar* Scht. 65, pronotum; 66, medio-ventral process of pygophore; 67, stylus. Fig. 68—69. *D. hutereauae* Scht. (type). 68, medio-ventral process of pygophore; 69, stylus

Daladeropsis dispar Scht. (Fig. 64—67)

Length ♂ 25 mm, ♀ 23 mm. Uniformly reddish brown.

Head tapering apicad. Proportions between antennal joints 18:20:19:15 (♂) or 18:19:19:15 (♀), 1st joint 1.2—1.44 times as long as diatone, 2nd only slightly depressed, 3rd (Fig. 64) narrowly clavate. Shape of pronotum (Fig. 65) unique: humeral lobes rounded, horizontal, lateral margins straight, densely and minutely serrate; transverse ridge in front of basal margin faint. Abdomen ovate. Tuberculation of venter remote and minute. Hind femur gracile, a little longer than tibia (39:35 in ♂, 41:40 in ♀).

Male genitalia: Pygophore a little narrower than in *D. hutereauae*; medio-ventral process (Fig. 66) pale, slender, digitate, recurved caudad. Stylus (Fig. 67) gracile.

Material studied: Zaire: Lulua, Kapanga, 1 ♂ and 1 ♀, XII.1932, F. G. Overlaet, author's collection; Katanga, Kafakumba, 1 ♀, I.1925, E. le Moult, Mus. Leiden (recorded as *D. hutereauae* by Blöte, 1938, p. 283).

4. *Carbula melanacantha* (F.) *breviscutum* SUBSPEC.NOV. (HET. PENTATOMIDAE) (Fig. 70—72)

Carbula melanacantha is, like many other species of the genus, highly variable in the shape of the humeral angles of the pronotum. They are usually sharp, horn-shaped, but also specimens (originally described as a separate species, *C. cuneata* Dist.) with bluntly triangular humeral lobes exist. Both forms are connected with intermediates and the shape of the humeral angles is not of any taxonomic value.

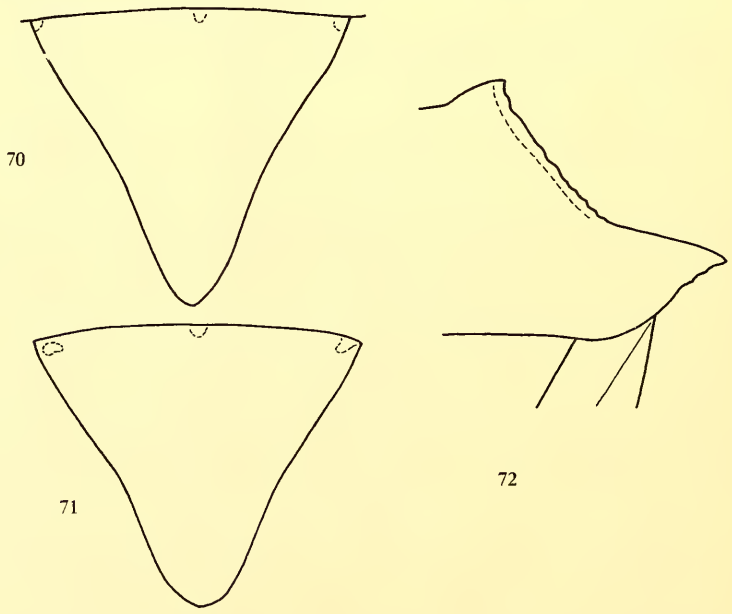

Fig. 70. *Carbula melanacantha melanacantha* (F.), scutellum. Fig. 71—72. *C. melanacantha breviscutum* ssp. n. 71, scutellum; 72, pronotum

A population from Adiopodoumé differs from the nominate form in several respects. Since the differences seem to be constant, the population apparently represents a separate geographical race and is described below. The shape of the humeral angles (Fig. 72) seems to be rather constant in the new race. The male genitalia in both races are similar.

C. melanacantha melanacantha (F.)	*C. melanacantha breviscutum* ssp.n.
1. body more elongate.	1. body appearing short and broad.
2. head somewhat longer, about as long as broad.	2. head shorter, broader than long (54:52).
3. scutellum elongate (Fig. 70), about 1.04 times as broad as long.	3. scutellum (Fig. 71) 1.09—1.1 times as broad as long, remarkably broad apically.
4. opaque evaporatoria of meso- and metathorax slightly embrowned; venter yellowish, with 3 regular black longitudinal bands, puncturing on the pale areas concolorous.	4. opaque evaporatoria of meso- and metathorax dark brown or blackish; venter yellow-brown, with 3 irregular dark brown longitudinal bands; the pale areas with scattered brown punctures among the common concolorous puncturing.
5. range: widespread in the Guinean subregion, the Sudan.	5. range: Ivory Coast.

Material studied: Ivory Coast: Adiopodoumé, 1 ♂, holotype and 6 paratypes (♂, ♀), IV—V.1964, leg. Cobben, author's collection, paratypes also in coll. of Laboratory of Entomology, Wageningen.

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J. DEN HOLLANDER. — The growth of larvae of *Tipula oleracea* Linnaeus, 1758 (Diptera, Tipulidae), p. 67—82, fig. 1—4.

J. DEN HOLLANDER. — The phenology and habitat of the species of the subgenus *Tipula* Linnaeus in the Netherlands (Diptera, Tipulidae), p. 83—97, fig. 1—5.

Tijdschrift voor Entomologie, deel 118, afl. 3—4 Gepubliceerd 14.XI.1975

THE GROWTH OF LARVAE OF TIPULA OLERACEA LINNAEUS, 1758 (DIPTERA, TIPULIDAE)

by

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Abstract

The growth of larvae of *T. oleracea* Linnaeus, 1758, was studied under laboratory conditions. The body length, the head capsule length as well as the head capsule width were taken as a measure of growth. In addition, some preliminary observations on *T. paludosa* Meigen, 1830, are given. The results are discussed in the context of the evolutionary relationships between the species of the subgenus *Tipula.*

Introduction

The present study was carried out in order to establish the evolutionary relationships between the species of the subgenus *Tipula,* one of the several subgenera of the genus *Tipula* Linnaeus, 1758 (Diptera, Tipulidae). Originally, this subdivision was based on wing markings and wing venation (Edwards, 1931). Subsequently it was supplemented by characteristics of the male hypopygium (Mannheims, 1952—1968; Savtshenko, 1961, 1964; Theowald, 1973) as well as larval and pupal characters (Theowald, 1957, 1967).

The aim of the present and forthcoming studies is to add biological and morphometric data to the already available systematic criteria in order to establish more precisely the evolutionary relationships between the species.

The species of the subgenus *Tipula* occur in the Palaearctic as well as in the Ethiopian region. The Palaearctic species may be divided into two groups on the basis of their geographical distribution. Three species (*T. paludosa* Meigen, 1830, *T. oleracea* Linnaeus, 1758, and *T. czizeki* De Jong, 1925) are wide-spread in Europa, and even throughout the Palaearctic region into Japan (*T. czizeki*). The other seven species are more or less restricted to the Mediterranean in a broad sense: *T. mediterranea* Lackschewitz, 1930 (Western Mediterranean), *T. italica* Lackschewitz, 1930 (eastern Mediterranean), *T. orientalis* Lackschewitz, 1930 (eastern Mediterranean and the Middle East), *T. kleinschmidti* Mannheims, 1950 (Spain), *T. hungarica* Lackschewitz, 1930 (Austria, only three specimens known), *T. plumbea* Fabricius, 1781 (southern France, Sardinia and Greece) and *T. atlantica* Mannheims, 1962 (Madeira, only three males known) (Mannheims, 1952, 1962; Den Hollander, 1975).

In the Netherlands and surrounding region only three species of the subgenus *Tipula* occur. These species, and especially *T. paludosa,* are very important economically as the larvae can cause serious damage to crops. Most of the species mentioned above have two generations per year, one flying in spring, the other in autumn. However, *T. paludosa, T. italica* and *T. czizeki* only show an autumn flying period. The number of genera-

tions per year, however, seems to be variable as Simova (pers. comm.) mentions a spring as well as an autumn generation for *T. czizeki* in Yugoslavia.

In nature several species occur together at the same time and in the same habitats. Moreover, the males of these species do not show clear courtship behaviour but try to copulate by grasping every tipulid female, independent of the species to which it belongs. So, under laboratory conditions, cross-matings can be observed which produce fertile eggs, and even larvae and adults can be obtained from these crosses, e.g. between *T. paludosa* and *T. czizeki, T. oleracea* and *T. czizeki,* and also between *T. oleracea* and *T. paludosa* (Hemmingsen & Theisen, 1956; Den Hollander, unpubl.). Moreover, among the descendants of a *T. czizeki* female caught in the field a *T. oleracea* resembling male was found. For this specimen the period from egg to adult fly lasted 49 days, which is normal for a true *T. oleracea.* From the same egg batch a *T. czizeki* female was bred after 104 days. This female was crossed with a *T. oleracea* male from the laboratory cultures and again a *T. oleracea* female emerged, after a development of 60 days (within the range of *T. oleracea*). The remaining larvae of the second mating (9) died between 20.viii and 17.ix.1974 (about 180 days old at 20.viii.1974) (Den Hollander, unpubl.).

Even more similarities are found in the larval and pupal stages of the species concerned than in the adult flies; moreover, differences in the structure of the egg shell could not be found (Theowald, 1967, and unpubl.). This makes it worthwhile to closely compare the different species and to study their interrelationships.

MATERIALS AND METHODS

The laboratory culture of *T. oleracea* was started with a female caught in the field (male unknown) in the neighbourhood of Amsterdam on 9 August, 1973. On the 10th of August this female laid eggs from which adult flies emerged from 8 till 22 October. From these adults new cultures were started on 11, 15 and 19 October. The third generation was started on 13 December. One male and one female of this third gen-

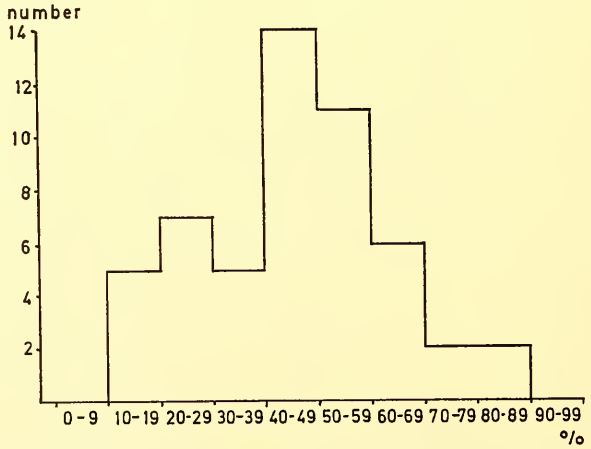

Fig. 1. The frequency distribution of the percentage of eggs from which *Tipula oleracea* larvae emerged, for 52 petri dishes with 1680 eggs

eration emerged on 11 February, 1974, and the latter produced fertile eggs on 13 February; the larvae of this fourth generation were used in the experiment. A parallel experiment was carried out with larvae descending from males and females of the next generation, which laid eggs on 29 May, 6 and 7 June. Table I presents some general information on the cultures used.

Two methods of rearing the larvae were used. In both cases females had been fertilized in the laboratory and afterwards were allowed to lay eggs in a plug of damp cotton-wool. After counting, the eggs were transferred either to a plastic box (18 × 15 × 9 cm) on wet sand or, in known quantities, on another wet plug in a plastic petri dish (diameter 9 cm, height 1.4 cm). Although the petri dishes were partitioned in three or four parts, the larvae, even the large larvae of the fourth stage, could freely move throughout the dishes. In both cases the larvae were fed with dried powdered grass (Laughlin, 1958).

The larvae emerged from the eggs on the fifth to seventh day after egg-laying (Table 2) and grew prosperously. However, the percentages of eggs from which larvae emerged proved to be quite variable (Fig. 1, Table 1). The mean percentage of hatching varied from 27 to 66% between the different cultures (Table 1), while it varied from

Table 1. General information on the laboratory cultures of *T. oleracea*

Date of start	number of eggs		% hatched		number of larvae fixed		first pupae (in days after egg laying)	last adults (in days after egg laying)
	petri dish	plastic box	petri dish	plastic box	petri dish	plastic box		
13 February	780	280	41	—	290	41	36	64
29 May	300	500	66	64	133	151	62	99
6 June	300	—	27	—	65	—	—	—
7 June	300	1200	41	47	64	161	55	102
					552	353		

Table 2. The percentage of the eggs from which larvae of *Tipula oleracea* emerged at different times after egg laying

Breeding		number of eggs	% hatched		
			after 5 days	after 6 days	after 7 days
13 February	petri dish	780	—	35	41
7 June	petri dish	300	17	41	41
7 june	plastic box	1200	13	47	47

10 to 90% in the different petri dishes, even within the same culture.

Mortality among the larvae was rather low, the greatest mortality occurring in the first two instars (14 and 8%, respectively) as well as in the second part of the fourth instar (12%) (Table 3).

Table 3. The mortality of *T. oleracea* larvae; the larvae are fixed during different periods after emergence, the % mortality refers to the total preceding period (all petri dish cultures)

Days after emergence	larval instar I	II	III	IV	total	number of eggs hatched	% mortality
1 - 7	108	10	—	—	118	137	14
8 - 14	5	86	16	—	107	138	22
15 - 24	—	2	117	43	162	206	21
25 - 35	—	—	9	94	103	129	20
36 - 48	—	—	—	46	46	68	32
					536	678	

The larvae were fixed in Faester's fluid (acetic acid 33%: alcohol 96%: glycerine: aqua dest. = 2: 35: 6: 57). When the larvae are killed in this fluid, at first the muscles totally relax, but afterwards contract to some extent. The larvae of the first experiment (started in February) were mostly measured at the day of killing (except those sampled at 8, 18, and 27 March, which were measured after 3, 2, and 6 days, respectively). The larvae of the experiments started during the end of May and the beginning of June all were measured after the experiment ended. Nevertheless, the larvae of the May/June experiment showed higher values for body length as compared to those of the March experiment. The effect of fixation in Faester's fluid is illustrated in Table 4; it shows that after one day the measurements do not change any more.

Table 4. The influence of fixation in Faester's fluid on the length of *Tipula oleracea* larvae (I: measured at the day of fixing; II—IV: 1, 2 and 3 days afterwards, respectively)

	I	II	III	IV	mean differences (mm) I-II	II-III	III-IV
body length (mm) n = 14	35.2	32.5	32.5	32.5	2.75	0.26	0.27

Table 5. The establishment of the accuracy of the measurements

	Body length (mm)	head capsule length (mm)	head capsule width (mm)
Magnification	1 ×	20 ×	40 ×
mean 1	22.6	2.79	0.83
mean 2	22.7	2.79	0.82
range 1	20.0—25.8	2.60—3.05	0.74—0.94
range 2	20.4—25.8	2.55—3.05	0.74—0.94
mean difference 1 - 2 (%)	1.12	1.03	1.55
number measured	25	25	25

The measurements (Fig. 2) were performed with a Zeiss dissectingmicroscope at a magnification of 40 × (the width of the head capsule between the antennal bases; the length of the head capsules in the first three instars; the length of the larval body during the first two days after emergence), 20 × (the length of the head capsule in the fourth larval instar; larval body length in the first instar), 10 × (the body length in the second instar). The body lengths of the larvae in the third and fourth instar were measured with vernier (0.1 mm) calliper. The accuracy of the measurements is given in Table 5.

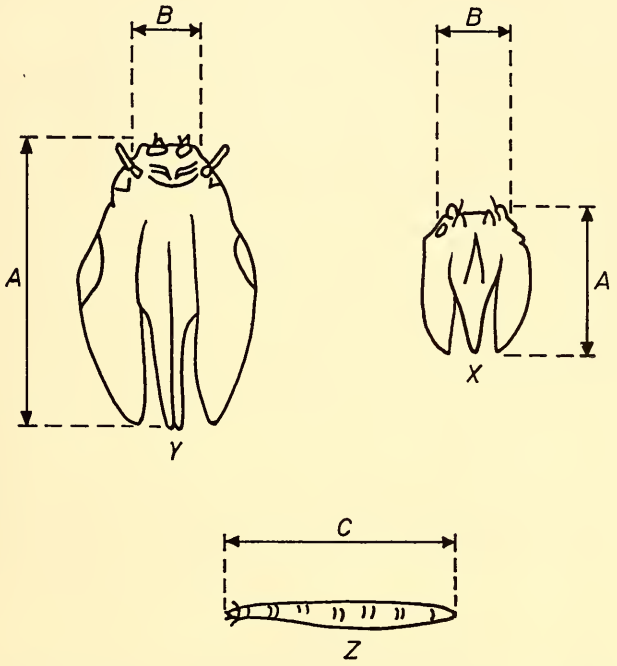

Fig. 2. The measured characters. X: first instar head capsule; Y: second, third and fourth instar head capsules; Z: larval body; A: head capsule length; B: head capsule width; C: larval body length

RESULTS

I. The durations of the larval instars

Larvae of *T. oleracea* were sampled from the laboratory cultures according to the scheme given in Table 6. This table illustrates the number of larvae fixed during the observation period as well as the occurring mortality. Besides, the fixed larvae have been distinguished as to the larval instar. Freshly moulted larvae can easily be recognized by the colour of the head capsule. Prior to moulting they are deep black whereas just after moulting the head capsules are still unsclerotized and therefore white. Thus, by following the larvae from day to day the occurrence of moulting could be easily detected. This method was used in the experiment started on 13 February. In the other experiments the width of the head capsule was used as an additional character to distinguish the larval instars (see chapter II).

Table 6. The number of *Tipula oleracea* larvae sampled at different times from the cultures. In brackets the numbers of eggs from which larvae emerged. (×): the total number of larvae emerged from the eggs amounted in these four samples to 76. (P): On this day the first pupae appeared in the culture. A: petri dish. B: plastic box culture

Culture days after egg laying	13 February		29 May		6 June	7 June		larval instars				
	A	B	A	B	A	A	B	I	II	III	IV	Total
6	13 (13)	—	—	20	—	—	—	33	—	—	—	33
7	4 (6)	—	—	—	—	—	—	4	—	—	—	4
8	10 (12)	—	18 (20)	—	—	—	—	28	—	—	—	28
9	16 (16)	—	—	—	—	—	—	16	—	—	—	16
10	13 (13)	—	15 (17)	—	—	—	—	28	—	—	—	28
12	16 (16)	—	13 (24)	—	—	—	20	22	27	—	—	49
13	12 (13)	—	—	—	—	—	—	4	8	—	—	12
14	15 (17)	—	20 (26)	20	—	—	—	2	53	—	—	55
15	7 (9)	—	—	—	—	—	—	—	7	—	—	7
16	14 (14)	—	11 (21)	—	—	—	—	—	25	—	—	25
19	15 (16)	—	13 (22)	—	—	—	20	—	16	32	—	48
20	9 (12)	—	—	—	—	—	—	—	—	9	—	9
21	—	—	9 (13)	20	—	—	—	—	1	28	—	29
22	27 (×)	—	—	—	—	—	—	—	2	25	—	27
23	13 (×)	—	16 (19)	—	—	—	—	—	—	28	1	29
26	13 (×)	—	9 (16)	—	—	—	20	—	—	25	17	42
27	22 (22)	—	—	—	—	—	—	—	—	22	—	22
28	—	—	9 (20)	20	—	17 (28)	—	—	1	10	35	46
29	18 (×)	—	—	—	—	—	—	—	—	7	11	18
30	22 (25)	—	—	—	—	—	—	—	—	8	14	22
32	—	—	—	—	16 (20)	—	—	—	—	—	16	16
33	—	20	—	—	—	12 (19)	20	—	—	2	50	52
35	8 (9)	—	—	21	—	—	—	—	—	—	29	29
36	13 (17)	(P)	—	—	—	—	—	—	—	—	13	13
39	—	—	—	—	22 (22)	—	—	—	—	—	22	22
40	10 (17)	—	—	—	—	—	21	—	—	—	31	31
42	—	21	—	20	—	14 (23)	—	—	—	—	55	55
45	—	—	—	—	18 (25)	—	—	—	—	—	18	18
46	—	—	—	—	—	—	20	—	—	—	20	20
49	—	—	—	20	—	—	—	—	—	—	20	20
52	—	—	—	—	—	5 (5)	—	—	—	—	5	5
53	—	—	—	—	9 (15)	—	—	—	—	—	9	9
54	—	—	—	—	—	—	20	—	—	—	20	20
55	—	—	—	10	—	(P)	—	—	—	—	10	10
56	—	—	—	—	—	16 (49)	—	—	—	—	16	16
59	—	—	—	—	—	—	20	—	—	—	20	20
62	—	—	—	(P)	—	—	—	—	—	—	—	—
total	290	41	133	151	65	64	161	137	140	196	432	905

Table 6 shows that the length of instar I amounts to 6 to 8 days. Within a period of three days all larvae moulted. The instar II larvae occur in the cultures for about 8 days, though they may occur in very small numbers in the cultures afterwards. Instar III larvae could be found for a period of 12 days; however, already from about 6 days after the appearance of the third instar larvae, instar IV larvae occurred in the cultures. So, the length of the third instar seems to vary. Instar IV larvae clearly get the upper hand about 10 days after the second moult. These larvae could be found in the cultures for a rather long period, a large part of which they did not show any activities. Before, the larvae could be seen creeping upon the substrate, especially early in the morning, and the results of their nocturnal activities were very clear in that the substrate had been strongly rooted up. However, just after the third moult, these activities could not be observed any more. Moreover, the larvae seemed to have moved deeper into the substrate and to stay there motionless.

The appearance of the first pupae rather varies for the various cultures. The earliest appearance occurred in the culture started at 13 February, viz., on the 36th day after egg laying and about 10 days after the start of the third moult. On the other hand, in the culture started at 29 May they appeared not before the 62nd day after egg laying, i.e. about 35 days after the beginning of the third moult. In fourteen other cultures, covering more than 500 pupae, the first pupae appeared in seven cases before the 50th day after egg laying, whereas in two cases they appeared as late as on the 71th day; the mean value amounted to 53.6 days. Therefore, considerable variations exist as to the length of the fourth larval instar in the various cultures, but also in one and the same culture: pupae generally appear over a period of about 20 days, but periods of up to 50 days do occur.

Summarizing the results it may be stated that synchronization is very strong during the egg stage as well as during both the first and second larval instar. Afterwards, synchronization decreases, so that adults appear over a considerable period, though being raised from one and the same egg batch.

II. The values of the measurements for each larval instar

Because both the body length and the length of the head capsules show intrastadial growth, it is not significant to give mean values for these characters as they only reflect the period of sampling. The width of the head capsule, measured between the antennae, on the other hand, does not show intrastadial growth, but increases suddenly just after each moult. So this character proves to be very useful for distinguishing the successive larval instars. The measurements are given in Table 7. Fig. 2 shows the characters measured in this study.

Table 7 A shows that the width of the head capsule increases from instar to instar by a factor of about 2.0. This factor seems to be somewhat higher in the first larval instar (2.1) than in the later instars (1.8). The length of the head capsule gradually increases, both within and between the successive larval instars. Discontinuities due to moulting do not exist in the distribution of the head capsule lengths. In agreement with this, the head capsules shed at moulting show values which lie in the upper part of the range of the head capsules of the former instar, as well as in the lower part of the range of the next instar. The increase in mean length of the shed head capsules over

Table 7. The values of the head capsule width (A), head capsule length (B), shed head capsule length (C) and body length (D) for *Tipula oleracea* larvae

A. The width of the head capsule (mm)

Culture	instar	mean	range	number measured
29 May	I	0.12	0.10—0.14	58
	II	0.25	0.24—0.26	66
	III	0.47	0.43—0.55	63
	IV	0.86	0.72—0.96	97
6 June	IV	0.89	0.77—0.98	65

B. The length of the head capsule (mm)

Culture/instar	I	II	III	IV
13 February	0.26—0.67	0.60—1.15	1.08—2.15	1.70—3.25
25 May	0.24—0.70	0.70—1.25	1.22—2.28	2.15—3.05
6 June				2.65—3.35
7 June	0.60—0.62	0.79—1.15	1.25—2.20	1.95—3.10
number measured	137	140	196	396

C. The length of the shed head capsules at moulting (mm) from culture 13 February

Number	instar	mean	range
68	I-II	0.64	0.60—0.70
119	II-III	1.13	1.00—1.25
52	III-IV	1.99	1.70—2.30
20	IV-pupa	2.86	2.65—3.20

D. The length of the body (mm)

Culture/instar	I	II	III	IV
13 February	1.1—5.1	3.3— 9.6	6.2—18.6	9.0—34.0
29 May	1.1—5.3	3.8—11.9	9.0—20.6	11.3—36.3
6 June				25.8—36.7
7 June	3.8—5.0	5.1—10.3	8.0—19.5	14.0—34.5
number measured	137	140	196	396

the successive moults amounts to about 1.7 (Table 7C). The largest proportional intra-instar increase in head capsule length was found during the first larval instar (× 2.9, i.e., the highest value divided by the lowest one, Table 7B), whereas these factors show about equal values in the other instars (× 2.0). The same holds true to a large extent for the body length (Table 7D). These values also gradually increase both within and between the different instars. However, some discontinuity seems to exist in the distributions due to moulting (see chapter III).

Again, growth (increase in body length) is proportionally greatest during the first larval instar (× 4.8). During the following instars the body length increases by factors amounting to 3.6, 3.3 and 4.1, respectively. Concerning the last factor one should take into account that this is realized during a much longer period than the other figures (see chapter I and Table 6).

Dyar's Law states that the larval head capsule generally grows in geometrical progression, increasing in size by a constant ratio at each moult. This rule also applies to the growth in lengths and weights and is valid in many insect species and other arthropods (Dyar, 1890; Wigglesworth, 1972; Imms, 1970). From the present data it may be concluded that Dyar's Law holds true for both the width of the head capsule (as measured in the present study) and the length of the shed head capsule. So both these characters can be considered very useful for differentiating between larval instars. On the contrary, Dyar's Law is not applicable to the length of the head capsule or body length because both show intrastadial growth. Therefore, these cannot be used as characters to distinguish the different instars or the numbers of instars, as, e.g., has been done by Lam & Webster (1972). The presence of head capsule size groups is no proof of corresponding instars, because the groups may have originated from different ovipositions or have been caused by ecological fluctuations.

Przibram's rule (Przibram & Megusar, 1912; Wigglesworth, 1972), another empirical law of growth, states that at each moult all linear dimensions increase by the ratio 1.26. However, all linear dimensions measured in the present study show much higher values of increase, whereas these values are not always constant for each moult. In general the growth-rate decreases in the successive instars.

III. The growth of larvae

The values of the measured characters are plotted against time in Fig. 3. It presents all measurements from the cultures described above, from the 6th to the 55th day after oviposition. Thus 56 samples, containing altogether 869 larvae, and taken at 34 different days have been incorporated (Table 6). Fig. 3, again, shows the discontinuous growth of the width of the head capsule. Both other measurements (body length and head capsule length) behaved in a very similar way during the observation period. The values gradually increase during the first three larval instars, and just after the third moult reach constant values, which are maintained until the end of instar IV. So growth of the larvae occurs in the first half of their life, which includes all three moults. However, during the growth period, the rate of growth gradually decreases, i.e. the proportional growth decreases with time. In addition, during the growth period, the relation between the length of the body and that of the head capsule tends to change. This becomes evident when plotting the length of the body against that of the head capsule (Fig. 4). It shows that at each moult a decrease occurs in body length, absolute, and relative to head capsule length. However, within each instar the growth of both shows to be clearly allometric.

As important differences exist between the size of male and female pupae (males are about 20% shorter), it might be assumed that these differences should already be reflected in instar IV larvae. However, analysis of the frequency distribution of the body length (189 larvae from 13 different samples) in the second part of the fourth instar (older than 37 days, Fig. 3) dit not reveal any bimodality.

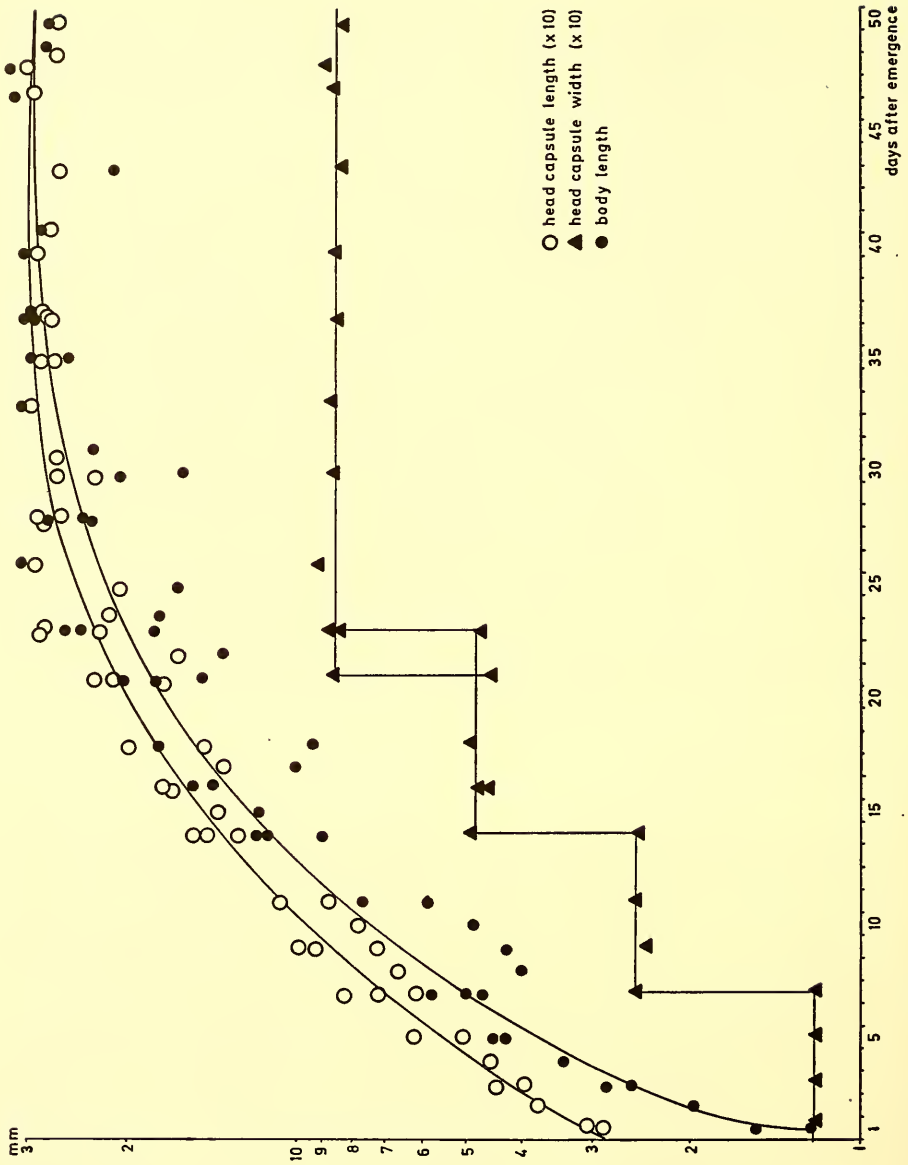

Fig. 3. The mean values for the head capsule length, head capsule width and body length during the four larval instars of *Tipula oleracea*

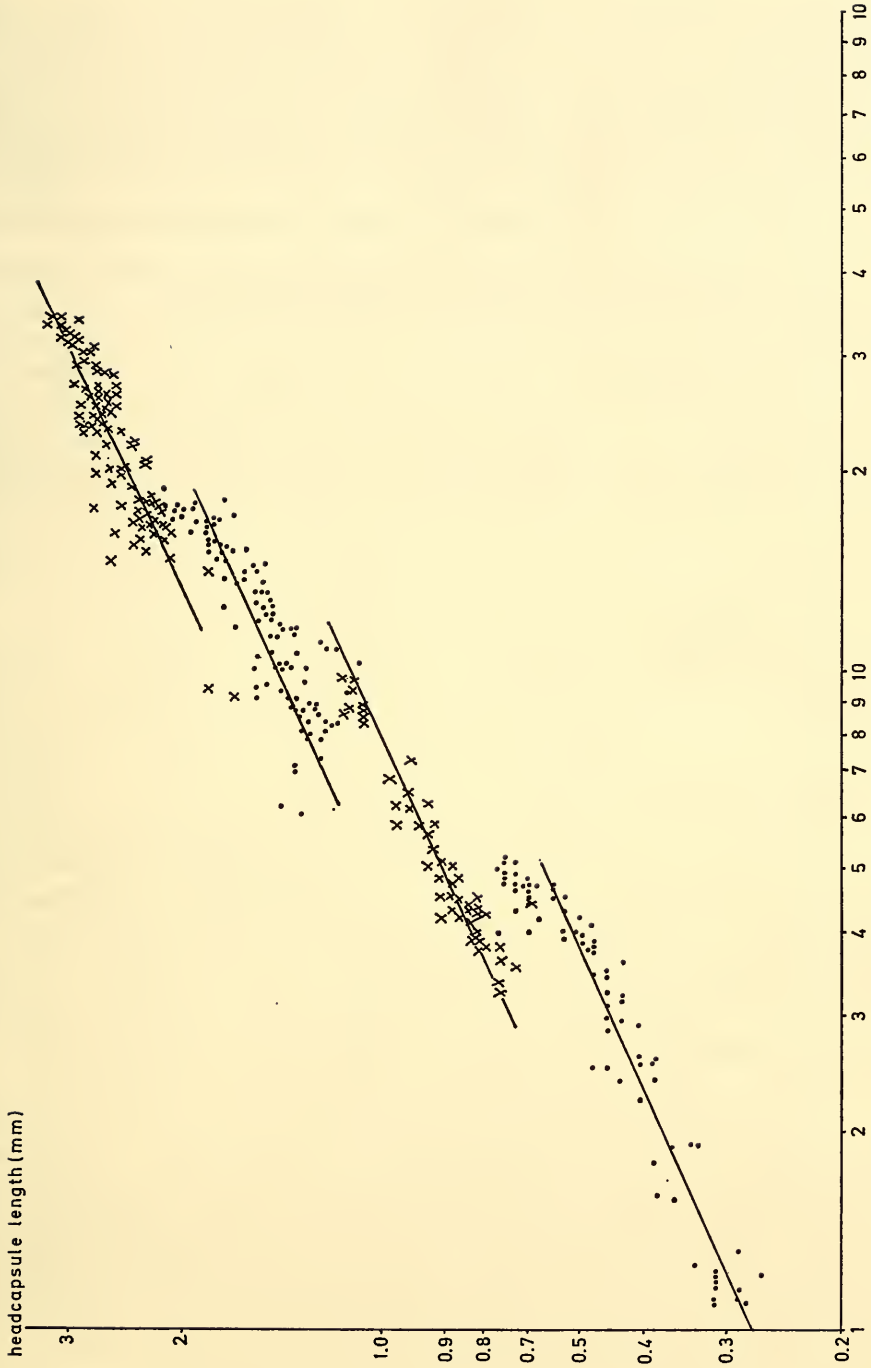

Fig. 4. The relation between head capsule length and body length for each of the four larval instars of *Tipula oleracea*

Nevertheless, "large" and "small" larvae can be distinguished in the cultures. From one culture (Table 8A) half of the larvae were selected at random. Both halves then were divided into three groups: yellow coloured larvae, small grey coloured larvae and large grey coloured larvae. One set of the groups was fixed in Faester's fluid, the other set was kept in order to establish the date of pupation as well as the pupal sex ratio. From another culture (Table 8B), the larvae were divided at first into two size groups, and afterwards from both samples 10 larvae were fixed. The results are given in Table 8. It shows that, in both males and females, the body shortens just before

Table 8. Differences in body length and head capsule length between *Tipula oleracea* larvae from which male, and larvae from which female pupae will arise

Culture A (about 90 days after egg-laying)	"yellow"	"small"	"large"
body length (mm)	23.5(17.0—30.8)	27.6(23.0—32.8)	31.3(26.4—34.4)
head capsule length (mm)	2.86(2.50—3.10)	2.76(2.50—3.05)	2.93(2.75—3.10)
head capsule width (mm)	0.87(0.79—0.91)	0.83(0.79—0.94)	0.89(0.79—0.96)
number fixed	18	29	28
number kept alive	21	28	29
first pupae (after days)	1	7	7
last pupae (after days)	11	25	33
total pupae	6♂, 7♀	11♂, 8♀	11♀
Culture B (56 days after egg-laying)			
body length (mm)		27.0(24.6—28.9)	30.9(27.8—35.7)
head capsule length (mm)		2.70(2.60—2.85)	3.00(2.90—3.10)
number fixed		10	10
number kept alive		24	24
first pupae (after days)		7	11
last pupae (after days)		38	33
total pupae		17♂, 1♀	17♀, 3♂

pupation. Simultaneously, the larvae become yellow. Although there is a considerable overlap, male larvae generally are smaller than female larvae, both in body and head capsule length. This overlap, as well as the differences between various cultures is responsible for the fact that the frequency distribution of the body lengths of fullgrown fourth instar larvae is not bimodal. Nevertheless, the results show that sex-differences become apparent at least at the beginning of the fourth instar. Because the differences in body length are reflected by the same differences in head capsule length, it is concluded that male larvae stop growing earlier than female larvae.

Comparison of the results of culture A with those of culture B shows that the determination of the sex in the larvae — in particular selecting the males — becomes

more difficult and less precise with advancing age. Whereas culture B was sexed just at the moment that the first pupae appeared, pupae were present in culture A for a period of about one month before the moment of sexing. From this culture already 100 ♂ and 12 ♀ had pupated in that period. In older cultures mistakes can easily be made between "yellow" larvae and "small" larvae, which may have caused the relatively large number of females produced by the "small" larvae (Table 8A).

IV. Preliminary observations on the growth of *Tipula paludosa*

Some preliminary observations were made on the size of the larvae of *T. paludosa* in the third and fourth larval instars. The larvae were obtained in two different ways. In the first place, fourth stage larvae were sampled in the field from April to August. Most of these larvae were raised to the adult stage (Den Hollander, in press); 23 of them were fixed as full grown fourth instar larvae. In the second place, *T. paludosa* larvae were bred in the laboratory from eggs laid by females which had been raised from the larvae mentioned above. Seven fourth stage larvae and 30 third stage larvae were sampled from this culture. The results are given in Table 9.

Table 9. The values (mm) for the body length, head capsule length (ranges) and head capsule width (ranges and means) of the third and fourth larval instars of *T. paludosa*. 1: larvae sampled in the field; 2: larvae bred in the laboratory; 3: summation of 1 and 2

Instar	number	body length	head capsule length	head capsule width
III	30	8.0—22.0	1.40—2.70	0.53—0.65 (0.58)
IV (1)	23	30.3—48.0	3.10—4.00	0.96—1.15 (1.04)
IV (2)	7	16.6—30.3	2.90—3.35	0.96—1.18 (1.06)
IV(3)	30	16.6—48.0	2.90—4.00	0.96—1.18 (1.04)

The first larvae emerged from the eggs after 7 days, most larvae hatching on the 8th day. After 48 days most of the larvae in the culture still were in the third instar. Thus, the developmental rate of *T. paludosa* seems to be somewhat lower as compared to that in *T. oleracea*, which probably is true for all instars.

Table 9 shows that the measurements show higher values in *T. paludosa* as compared to *T. oleracea*. This holds especially for the head capsule width, in which the ranges scarcely overlap. The overlap is considerable for the two other measurements.

Both the length of the body and the head capsule length show intrastadial growth in *T. paludosa*, and also in *T. oleracea*. Plotting the length of the body against that of the head capsule (compare Fig. 4: *T. oleracea*) again the clearly allometric growth of both measurements within each larval stage is shown. The results suggest that the regression lines of the larval instars of *T. paludosa* parallel those of *T. oleracea*. In the formula $\log y = \log a + b \log x$, which describes the relationship between the two variables, body length and head capsule length, only the y-intercept (a) differs for the different larval instars, as well as between the different species; the regression coefficient (b) probably shows the same value throughout the different larval instars and in both species. Thus, the specific differences between *T. paludosa* and *T. oleracea* only concern

the fact that the former species has longer larval head capsules (about 10%) than *T. oleracea* larvae of the same body length. These differences may be traced back to the differences in egg size between the two species (Hemmingsen & Birger Jensen, 1972). The increase of both measurements in relation to each other, seems to be similar in both species, though differences in the durations of the larval instars do occur.

DISCUSSION

Up till now many difficulties existed in recognizing the different species of the subgenus *Tipula* Linnaeus, 1758, especially in the immature stages. In adults this is also true for females. In addition, generally two or more species may be found in the same habitat together. Despite the rather distinct shape of the male genitalia, cross pairings can be achieved in the laboratory between males and females of different species, and even between those of different subgenera (e.g. *T. czizeki* and *T. luteipennis*, subgenus *Tipula* and *Platytipula*, respectively). Sometimes copulating pairs consisting of different species have been caught in the field (*T.* (*Tipula*) *paludosa* Meigen ♂ × *T.* (*Mediotipula*)? *brolemanni* Pierre ♀; Theowald, pers. comm.). This has also been observed for the species of the subgenus *Tipula* which occur in the Netherlands (cf. Introduction). The species of the subgenus *Tipula* thus show rather great similarities and close relationships. It is, therefore, very interesting to compare these species as to their biology. The present paper deals with the growth of *T. oleracea* and is a first contribution to this field of research.

The results show that the development of the larvae takes about 50—60 days under laboratory conditions (20—25° C), half of this period is covered by the fourth instar. Laughlin (1958, 1960) found that the complete life cycle of *T. oleracea* at 21° C takes an average of 11—12 weeks, which is in accordance with the present results. He also found the extremely wide variation in the duration of the fourth instar; however, his figures show that not only the length of the fourth instar varies, but also that of the other instars. The present results show that synchronization is rather strong from the egg stage up to the third moult. Variations in the total length of the larval period are, therefore, mainly due to variations in the length of the fourth instar.

Laughlin (1960), measuring the weight of the larvae, showed that growth is exponential during the first three instars whereas a constant daily weight increase occurs in the fourth instar. Just before pupation the weight decreases with about 50%. To the contrary, the present study reveals that the length of the body as well as the length of the head capsule do show exponential growth, though the relationships between $\log_{10}$ length and time are not linear, i.e., the growth rate decreases in the successive larval instars. Moreover, only during the first ten days of the fourth instar these measures increase in value but later remain at a constant level. Thus, about 75% of the increase in length occurs in the first half of the larval period.

Rodriguez & Maldonado (1974), studying the praying mantis *Stagmatoptera biocellata*, also found that the growth rate decreased in the successive instars. In addition they found that Dyar's law, as well as Przibram's rule, did not apply to this species, as was equally the case in the present study. A constant body size, measured in body weight, was also found in the last larval instar of *Calliphora* (Vijverberg, 1974). In this species a significant growth retardation of the larvae occurred after about 25—30% of the last larval instar had elapsed. During that period important changes in many

processes occur in Diptera e.g., in growth, behaviour, hormone titres, etc. (survey in Vijverberg, 1974).

The above phenomena are very interesting when compared to the growth of *T. paludosa*. Whereas *T. oleracea* completes two generations a year, *T. paludosa* has an annual life cycle. However, both species overwinter as third instar larvae and moult to the fourth instar during early spring (April). Thus, growth of *T. paludosa* equals that of *T. oleracea* which begins to grow during the same period (August, September). However, adults of *Tipula oleracea* emerge in May but those of *Tipula paludosa* only as late as August. So, the differences in phenology between both species are the results of differences in the length of the fourth instar. Both species show very little activities as fourth instar larvae and, in addition, there is little or no growth during this period (De Jong, 1925; Laughlin, 1967; Den Hollander, in press).

On the basis of the above data the hypothesis may be put forward that *T. oleracea* and *T. paludosa* have evolved under different climatological conditions, *T. oleracea* under warm and *T. paludosa* under cold conditions. Under colder conditions there may then have been a selection pressure towards longer fourth instar duration, perhaps because the eggs and/or the young larvae could not develop in early summer conditions when the surface became inundated by melting water. Both eggs and larvae of *T. paludosa* as well as of *T. oleracea* are susceptible to soil flooding (Meats, 1970, 1972). Other data in favour of this hypothesis are the following: the emergence of adults of *T. paludosa* is much more synchronized than in *T. oleracea*, and in *T. paludosa* females the wings are shortened in relation to body length which is a character which occurs especially in organisms adapted to colder climates (Beyers, 1969). It might be very worthwhile, in this context, to select strains of *T. oleracea* with the longer durations of the fourth instar and compare these strains to *T. paludosa*.

The data presented here reveal a supplementary character to distinguish larvae of *T. paludosa* and *T. oleracea*. Brindle (1959) and Theowald (1967) mention differences in the shape of the ventral papillae of the anal segments. However, this character is rather variable, and besides, it is not distinct but gradual. However, the width of the head capsule, measured between the antennal bases can be established easily and with great accuracy. The mean values for the different instars lie on a straight line when the $\log_{10}$ of them is plotted against the larval instar, both in *T. oleracea* and in *T. paludosa* (Table 7; Hemmingsen, 1965). The results of the measurements in *T. paludosa* showed mean values of 0.58 for the third larval stage and 1.04 for the fourth larval stage (Table 9). From these values, and from the assumption that the lines for both species run parallel (which is the case in *T. saginata* Bergroth and *T. paludosa*, see Hemmingsen, 1965), the mean values for the first two instars of *T. paludosa* can be deduced (0.16 and 0.30 mm, respectively). Because of the rather slight variation in this character, one may expect these values to be useful to distinguish between *T. oleracea* and *T. paludosa*. Besides, slight differences in colour exist between the larvae of both species (*T. paludosa* is more yellowish, *T. oleracea* more greyish), as well as in size (*T. paludosa* is bigger). However, both characters change just prior to pupation, i.e., *T. oleracea* larvae then become also yellowish, whereas the larvae of both species become smaller.

Unfortunately, it seems very difficult to distinguish between the larvae of *T. czizeki* and *T. oleracea*. Some preliminary measurements do not show any differences between the larvae of both species; in addition, they also are coloured identically.

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THE PHENOLOGY AND HABITAT OF THE SPECIES OF THE SUBGENUS TIPULA LINNAEUS IN THE NETHERLANDS (DIPTERA, TIPULIDAE)

by

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Abstract

Six localities in the neighbourhood of Amsterdam (the Netherlands) were sampled twice a month from April to November in 1973, as well as in 1974, in order to investigate the occurrence of adults of the subgenus *Tipula*. Together with supplementary data from the museum collection and from laboratory breedings, the phenology of the species was established. In addition, observations were made on the habitat selection of some species. The results are discussed in the context of the evolutionary relationships between the species studied.

Introduction

Three species of the subgenus *Tipula* occur in the Netherlands, viz., *T. oleracea* Linnaeus, 1758, *T. paludosa* Meigen, 1830, and *T. czizeki* De Jong, 1925. The species differ in the shape of the inner dististyle of the male hypopygium, the colour of the antennal flagellum, as well as the distance between the eyes measured on the underside of the head. Besides, there are some differences in general coloration (Mannheims, 1950; Den Hollander, in press). The larvae of the three species are morphologically very similar (Theowald, 1957, 1967; Brindle, 1959).

The species differ ecologically. Generally, both *T. paludosa* and *T. czizeki* are univoltine; *T. oleracea,* on the other hand, is a bivoltine species. However, differences in the number of generations per year occur, which may be caused, as with *T. paludosa* and *T. oleracea,* by differences in the length of the fourth larval instar (Den Hollander, in press). Because this length shows a rather large variation in some species reared under laboratory conditions, it may be presumed that in nature the number of generations per year may vary in some localities and some years.

In this paper the phenology of the species mentioned above is dealt with. The results are discussed in the context of the systematic relationships of and the possibility of hybridization between the European species of the subgenus.

Material and methods

The phenology of the species of the subgenus *Tipula* was studied in four different ways.

In the first place the material present in the Institute of Taxonomic Zoology (Zoological Museum), Amsterdam, was studied as to the dates of collecting. For comparison, also the species of the subgenus *Tipula* which do not occur in the

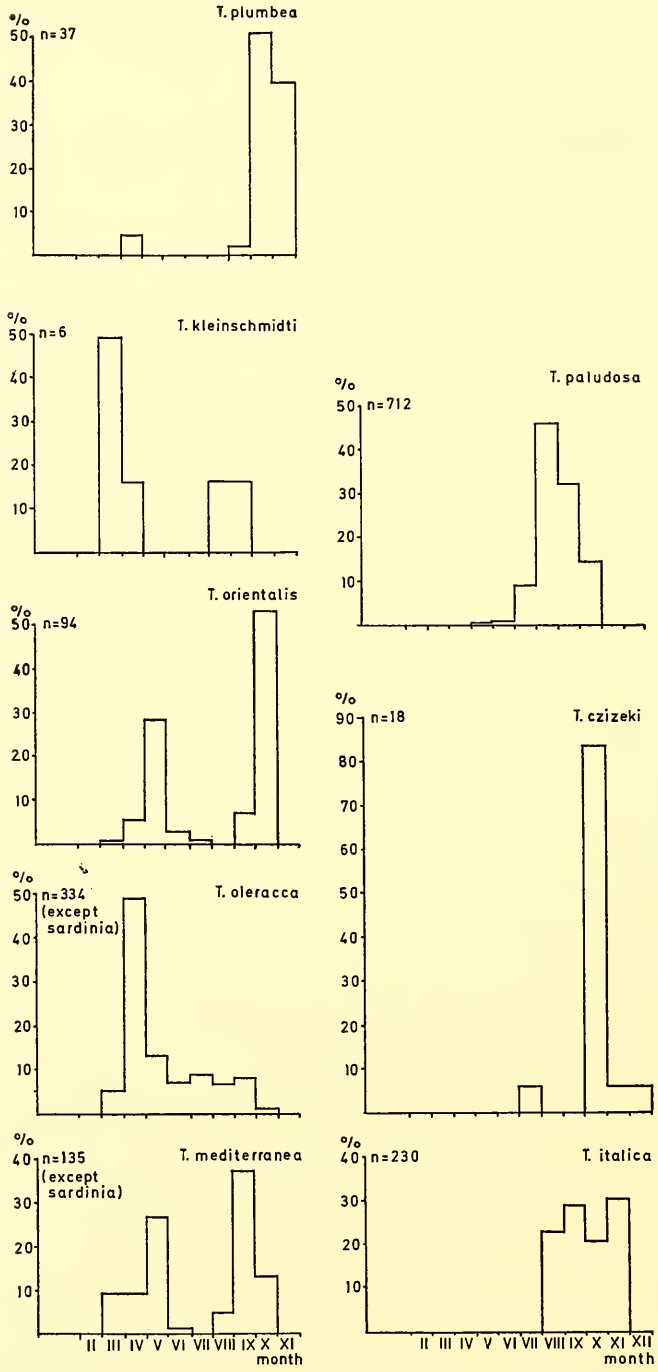


Fig. 1. The frequency distributions (%) of collecting dates for the species of the subgenus *Tipula*

Netherlands are incorporated in this part of the study. These species, viz. *T. mediterranea* Lackschewitz, 1930, *T. orientalis* Lackschewitz, 1930, *T. italica* Lackschewitz, 1930, *T. kleinschmidti* Mannheims, 1950, and *T. plumbea* Fabricius, 1781, occur [in southern Europe] around the Mediterranean.

In the second place, six localities in the neighbourhood of Amsterdam (Waterland) were sampled bimonthly from April to November during 1973 and 1974, by sweeping.

The descendants of females of *T. oleracea*, reared in the laboratory, were studied in order to obtain data on emergency and sex ratio.

Finally, at one locality (Diemerzeedijk, Amsterdam) the numbers of Tipulidae were counted and their possible correlation with the habitat structure investigated.

Results

I. Museum collection.

The distribution (%) of the dates of collecting of the species present in the museum collection is given in Fig. 1, 2 and 3. Fig. 1 presents the material from all over Europe, except the Netherlands; Fig. 2, the material from Sardinia only, and Fig. 3 relates to the Dutch material.

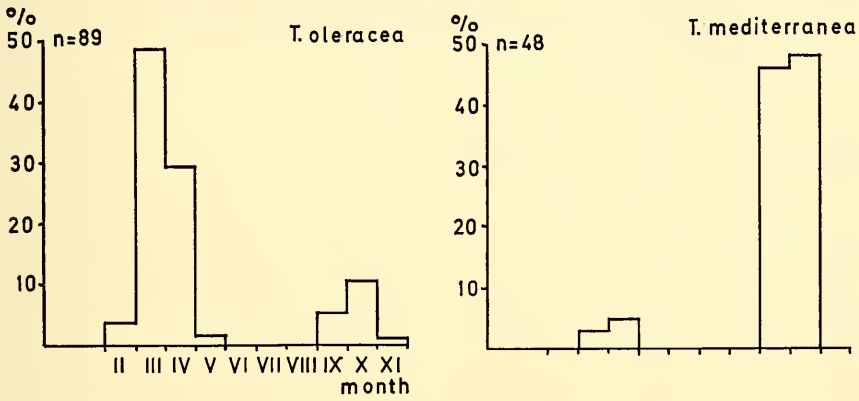


Fig. 2. The frequency distributions (%) of collecting dates for *Tipula oleracea* and *T. mediterranea* from Sardinia

Fig. 1 shows that only three (*T. paludosa, T. italica* and *T. czizeki*) out of the eight European species of the subgenus *Tipula* are univoltine, the others being more or less clearly bivoltine. Some very small differences seem to exist between the species as regards the period in which the highest numbers occur.

The highest numbers of the spring generation of *T. oleracea* occur in April, those of both *T. mediterranea* and *T. orientalis* occur in May. The differences in the autumn flying period of the bivoltine species seem to be of minor importance, though *T. plumbea* flies very late in the autumn. *T. mediterranea,* on the other hand, is the earliest species. In the same way some differences occur in the flying periods of the univoltine species, i.e., *T. paludosa* shows the highest numbers in August and *T. czizeki* in October. *T. italica* is present in the Amsterdam collection in about equal numbers from August, September, October and November. However, all November specimens (68) were caught together at the same locality in Lesvos (Greece).

Despite these small differences in the flying periods between the species, the overlap is such that in April (bivoltine species), as well as in October (all species) specimens of all species can be found on the wing. Therefore, a species barrier due to differences in flying period, if existing at all, must be very weak.

In the bivoltine species, differences in abundance are found between the spring and autumn generations. This is most conspicuous in *T. oleracea* and *T. plumbea*, the first showing a dominant spring generation, the latter a dominant generation in autumn. Moreover, the 19 specimens of *T. plumbea* collected in Sardinia by F. Hartig (sampled on fixed light traps during the whole year) as well as those collected by R. Prota (14 specimens) were all collected in the autumn. Only two specimens of *T. plumbea* were sampled in spring (April) in Greece. A similar phenomenon is shown by *T. oleracea* and *T. mediterranea*, both bivoltine species, from Sardinia. 89 specimens of *T. oleracea* and 48 specimens of *T. mediterranea* were sampled by light traps all over the year. However, 80% of *T. oleracea* specimens occurred in spring, while, on the other hand, 90% of the *T. mediterranea* specimens occurred in autumn (Fig. 2).

Thus it seems possible that these species are not obligatory bivoltine. In the same way, *T. czizeki* does not seem to be obligatory univoltine, as Simova reports that *T. czizeki* occurs in Yugoslavia in spring (pers. comm.).

The Dutch species of the subgenus *Tipula* (Fig. 3) behave, in general, like they do outside the Netherlands. *T. czizeki* is found during October, *T. paludosa* during

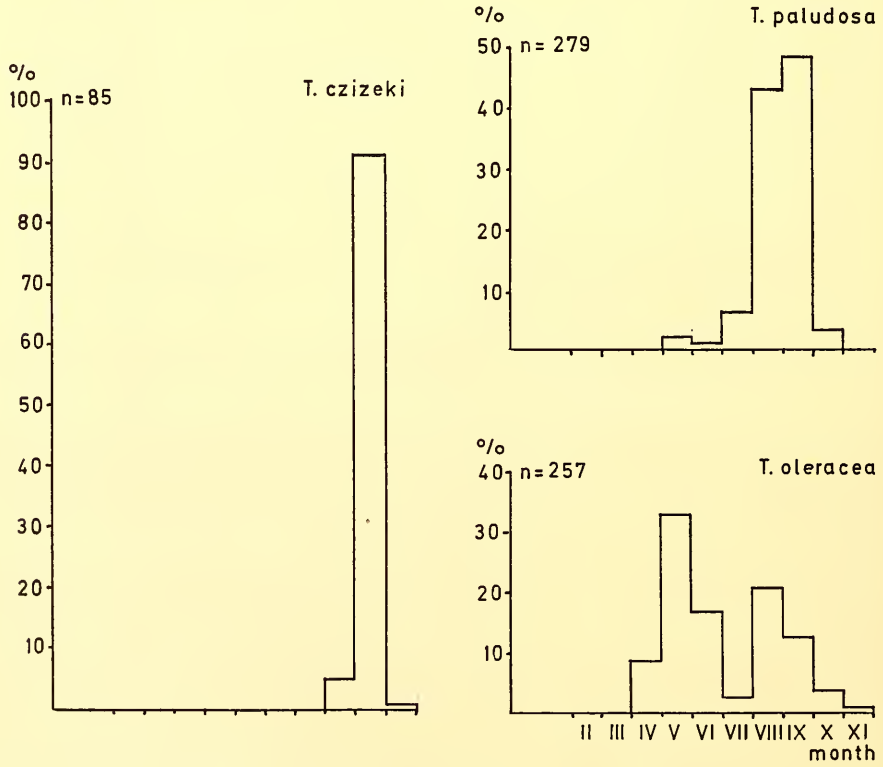


Fig. 3. The frequency distributions (%) of collecting dates for *Tipula oleracea, T. paludosa* and *T. czizeki* from the Netherlands

August and September. *T. oleracea* shows a somewhat aberrant picture as compared with Fig. 1. The main spring flying period in the Netherlands is in May, whereas it is in April in the rest of Europe (mainly France). In addition, in the Netherlands *T. oleracea* appears to be clearly bivoltine, whereas Fig. 1 shows a very small autumn flying period.

Fig. 3 also shows that, in the Netherlands, only very small overlap exists in the flying periods of *T. czizeki* and those of both *T. paludosa* and *T. oleracea*. Those of the latter two species, however, completely overlap during autumn.

The above results show that the separation in univoltine and bivoltine species is not strict. In some localities, and perhaps in some years, species may be univoltine while they are bivoltine in other localities, and vice versa. Though some differences exist between the species as regards the period in which the highest numbers occur, the general picture agrees very well both in the univoltine and the bivoltine species.

II. Field sampling data.

The results of the bimonthly sampling of six localities in the neighbourhood of Amsterdam are given in Table 1 and Table 2.

Table 1. The total numbers of males and females caught in the six localities together for the successive years. A, *T. oleracea*, B, *T. paludosa*, C, *T. czizeki*. 4 ..... 10 = April ..... October. I: first half, II: second half of the respective month

Period of sampling	♂		♀		total		total duration (min.)	
	73	74	73	74	73	74	73	74
A 4 II	1	12	—	4	1	16	140	100
5 I	—	22	—	8	—	30	85	160
5 II	14	103	8	14	22	117	200	190
6 I	14	61	10	14	24	75	180	150
6 II	2	42	8	18	10	60	170	120
7 I	1	1	5	4	6	5	165	90
7 II	—	—	—	—	—	—	60	30
8 I	12	4	3	2	15	6	175	120
8 II		57		23		80		120
9 I	10	16	5	6	15	22	120	70
9 II	2	15	—	—	2	15	30	90
10 I	6	13	18	—	24	13	445	100
10 II	—	—	—	—	—	—	155	70
B 8 I	1	—	—	—	1	—	175	120
8 II		83		4		87		100
9 I	83	39	16	26	99	65	95	70
9 II	—	—	—	—	—	—	30	90
10 I	2	—	1	—	3	—	335	100
10 II	—	—	—	—	—	—	155	70
C 9 II	—	—	—	—	—	—	30	90
10 I	13	2	1	3	14	5	445	100
10 II	32	5	9	2	41	7	425	60

Table 2. The numbers of flies (♂ + ♀) per 30 min. for the respective localities and the successive years (Compare Table 1)

	Localities												Total	
Period of	DZ		BH		YP		HS		HB		PD			
sampling	73	74	73	74	73	74	73	74	73	74	73	74	1973	1974
A 4 II	1	10	—	—	—	—	—		—	9	—	—	—	4.8
5 I	—	5	—	—	—	12		6	—	9		—	—	5.6
5 II	5	26	—	—	1	12			5	14	7		3.3	18.5
6 I	18	25	4	—	1	36	—	18	5	6	—	6	4.0	15.0
6 II	1	20			—	9		9	7	18	—	—	1.8	15.0
7 I	—	2	—		—	—	—	—	6	3	—	—	1.1	1.7
7 II	—	—							—	—			—	—
8 I	5	3	1	—	6	2	—	2	3	—	1	—	2.3	1.5
8 II		15		27		84		18		30		6		20.0
9 I	6	7	4		9		—	36	6	10	—	—	3.8	9.4
9 II	4	—		4		6		30		—		3	2.0	5.0
10 I	4	—	—	2	—	2	9	36	1	—	—	—	1.6	4.0
10 II	—	—	—		—		—	—	—	—	—	—	—	—
B 8 I	—	—	—	—	—	—	1	—	—	—	—	—	—	—
8 II		33		12		24		36		4		18		26.1
9 I	40	22	24		30		104	36	24	21	63	18	31.3	27.9
9 II	—	—		—		—		—		—		—	—	—
10 I	—	—	—	—	—	—	—	—	1	—	1	—	—	—
10 II	—	—	—		—		—	—	—		—		—	—
C 9 II	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10 I	2	5	—	—	—	—	—	—	—	—	—	—	0.9	1.5
10 II	4	7	2		—		—	—	—		—		2.8	3.5

A. *T. oleracea*. The results given in Table IA confirm the presumed phenology as inferred from the material present in the museum collection (Fig. 3). The first adults appear between the second half of April and the middle of May, this being variable from year to year, probably under the influence of weather conditions. In 1973, for instance, only very few specimens could be caught before the middle of May, but in 1974 rather large numbers occurred already during the second half of April. The highest numbers of *T. oleracea* occur during the end of May and the beginning of June; afterwards the numbers become lower and the last specimens of the spring generation fly in the very beginning of July. During the larger part of July, *T. oleracea* could not be caught at all.

The first specimens of the autumn generation appear at the beginning of August. The highest numbers of this generation occur during the end of August and the beginning of September; however, *T. oleracea* could be collected as late as the first half of October. Consequently, the flying periods of both generations of *T. oleracea* last for about two months.

Generally, males are more easily collected than females because of their higher activity (De Jong, 1925). Nevertheless, in 1973, the total numbers caught of both sexes were about equal. In 1974, on the other hand, considerably more males than females were caught. In both years, however, as well as in both generations of either year, the sex ratio changed clearly from the beginning towards the end of the flying period, i.e., at first the males had the upper hand, but towards the end of the flying period the number of females became proportionally larger; at the very end of the flying period the absolute numbers of females were even larger than those of males (Table 1A, 1973).

Rather large differences exist in the total numbers of *T. oleracea* caught in both years. In 1974 they were about five times as high as in 1973. This showed to be true for both the spring and the autumn generations and applied to most of the localities sampled.

Yearly differences, as well as generation differences exist in some localities (Table 2A). In 1973, *T. oleracea* occurred in two localities (DZ and HB) in large numbers, in the other four localities the numbers were much smaller. In 1974, on the other hand, large numbers of *T. oleracea* could be found in four localities. Locality BH, in 1973, showed a spring as well as an autumn generation of *T. oleracea,* though the numbers were rather small. In 1974, the spring generation could not be established at all, while the autumn generation occurred in rather large numbers. The opposite took place in locality YP where in 1973 the spring generation almost lacked and in 1974 both generations occurred in large numbers. Locality HS showed again another phenomenon. Here *T. oleracea* did not occur at all in 1973 (except during the beginning of October, however, these females flew high over the area and were assumed to be migrants), but in 1974 both the spring and the autumn generations were distinct.

B. *T. paludosa.* The results, given in Table 1B, confirm the presumed phenology on the basis of the material present in the museum collection (Fig. 3). *T. paludosa* males and females were almost exclusively found during the second half of August and the first half of September. Only very small numbers could be collected in the beginning of August while some specimens could be caught in October. *T. paludosa* was not observed at all before August. These results make very clear that *T. paludosa* is a univoltine species, showing a rather short flying period as compared with *T. oleracea* (2 months).

Males of *T. paludosa* were caught in considerably larger numbers than females. The overall sex ratio ranged from about 4—5 males to one female in *T. paludosa,* as compared with 2—3 in *T. oleracea.* Changes in this ratio during the flying period could not be observed, partly due to the sampling method (only two sampling periods during the main period of *T. paludosa*).

Differences in total numbers of *T. paludosa* in the two years do not seem to exist. These numbers appear to be about ten times as high as those of *T. oleracea* in 1973, but only about two times as high in 1974, exclusively caused by the increase in numbers of *T. oleracea* in that year.

Though some differences may exist between the different localities (Table 2B), the main conclusion which can be drawn from the present results is that *T. paludosa* occurs in large numbers in all localities sampled during a rather limited period in August and September.

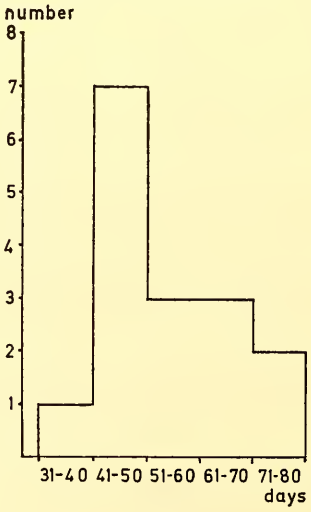
Both in 1973 and 1974, fourth instar larvae of *T. paludosa* were sampled in the field,

from April to the beginning of August. The larvae were reared in the laboratory and the period in which the pupae emerged as well as their sex were noted. The results are given in Table 3. About equal numbers of male and female pupae emerged from the sampled larvae, during the same period in which in the field pupation also occurred. Though the numbers of pupae are rather small, the figures suggest that changes in the sex ratio during the period of pupation in the cultures do not occur, this in contradistinction to *T. oleracea* (see chapter III).

C. *T. czizeki.* Specimens of this species could be caught only during October (Table 1C) in both years. Moreover, the total numbers appeared to be very small; in addition, this species was found in only two of the six localities investigated (Table 2C). These results are completely in accordance with those based on the material present in the museum collection (Chapter I). It thus appears that *T. czizeki* occurs in smaller numbers and in more limited areas than *T. oleracea*, but especially when compared to *T. paludosa.* During the period of investigation, *T. czizeki* proved to be clearly univoltine, flying in late autumn.

D. Conclusions. *T. oleracea* occurs in varying numbers in a variety of localities, both in spring and in autumn. The autumn generation completely overlaps, both in time and in space, the only generation of *T. paludosa*, which in the area of investigation occurs in large numbers and wide-spread during about one month in late summer. To a lesser extent some overlap exists between *T. oleracea* and *T. czizeki*, the latter species occurring in small numbers in limited areas during autumn. *T. czizeki* is entirely isolated from *T. paludosa* by the differences in flying period.

III. Laboratory breeding data. *T. oleracea* was reared in the laboratory according to the method described elsewhere (Den Hollander, in press). Sixteen cultures were raised from which 510 specimens were obtained. These descendants were analysed as to the



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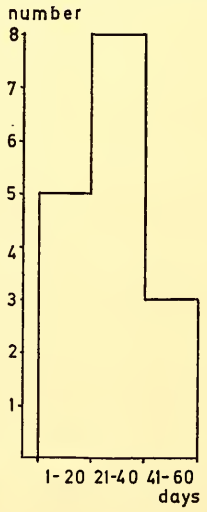

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Fig. 4. The duration of the period between egg laying and the appearance of the first pupae in laboratory cultures of *T. oleracea.* Fig. 5. The duration of the period that pupae occur in laboratory cultures of *T. oleracea*

Table 3. The number of male and female pupae of *T. paludosa* emerging in the respective periods from larvae caught in the field

Period	male	female	total
— 30/7	2	2	4
— 6/8	2	2	4
— 13/8	1	6	7
— 20/8	10	8	18
— 27/8	5	6	11
— 3/9	6	7	13
— 10/9	2	1	3
— 17/9	—	—	—
— 24/9	2	2	4
	30	34	64

date of emergence, the sex ratio, the duration of the pupal stage and the longevity of the adults.

The duration of the period between the egg laying and the appearance of the first pupae in the cultures varied from 36 to 71 days, the mean being 53 days (Fig. 4). Also the period during which pupae occurred in the cultures appeared to be variable (9—52 days, M = 28; Fig. 5). However, this variability seemed to be correlated with the number of pupae which arose in the cultures: the higher the density of the larvae, though derived from the same egg batch, the longer the period during which pupae occurred in the cultures. Whereas mortality was rather low during the different larval stages, only 53% of 335 full grown fourth stage larvae pupated. To the contrary, from 78% of 219 pupae adult flies emerged. About 20% of these flies, emerging from the pupae, died before reproducing. Thus, in the laboratory out of about 600 eggs (the mean number of eggs per female) about 40 reproducing adult flies emerged, 20 males and 20 females.

More than half of the total number of pupae appeared in the cultures during the first two weeks after the appearence of the first pupa (Table 4). The other pupae

Table 4. The appearance of pupae and changes in the sex ratio in laboratory cultures of *T. oleracea*

	♂	♀	total	cum. %	♂/♀
1st day	7	1	8	3	7.0
1st week	39	23	62	26	1.7
2nd week	53	33	86	58	1.6
3rd week	29	25	54	79	1.2
4th week	8	20	28	89	0.4
5th week	2	13	15	95	0.2
6th week	3	10	13	100	0.3
7th week	1	—	1	100	—

appeared during the following five weeks. Table 4 clearly shows that the sex ratio changed during the period that pupae occurred in the cultures. In the beginning of this period male pupae dominated, afterwards females became more and more dominant. In some cultures both the first emerging males and the last emerging females did not even have the opportunity to reproduce, as the opposite sex was not available during their life.

Although there exists some variability in the length of the pupal stage, most of the pupae occurred during seven days in the cultures, both males and females (Table 5).

Table 5. The duration of the pupal stage of *T. oleracea*

Duration in days	♂	♀	total
5	3	—	3
6	7	10	17
7	44	28	72
8	26	8	34
9	5	—	5
10	5	2	7
	—	—	—
	90	48	138
Mean	7.4	7.1	7.3

Because part of the variation is due to the method of observation (once a day, Saturday and Sunday excluded) it may be concluded that the real length of the pupal stage is seven days. Differences in the duration of the pupal stage between male and female pupae do not seem to exist.

The life span of the adult flies varied from 0—16 days (Table 6). About 10—15 %

Table 6. The life span of males and females of *T. oleracea*

Days after emergence	♂	♀
0	12	5
1—2	2	2
3—4	5	3
5—6	11	4
7—8	20	13
9—10	6	7
11—12	3	3
13—14	—	5
15—16	—	1
	59	43
Mean	5.4	7.3

already died on the day of emergence. Most male flies, however, lived 5—8 days, most female flies 7—10 days. The mean values amounted to 6.8 days and 8.2 days for males and females, respectively (the specimens dying at the day of emergence excluded). So the life span of females appears to be somewhat longer than that of males (about 15—20 %). The flies do not take up food during their adult life, they only need some water. Adding sugar to a wet plug of cotton-wool from which the flies drank did not clearly influence the length of their life (Table 7). Neither the number of eggs

Table 7. The influence of the addition of sugar on the life span (mean, range) and egg laying of *T. oleracea*

Life span	with sugar	n	without sugar	n
♂	7.8 (3—11)	4	9.0 (6—12)	3
♀	11.4 (6—15)	5	8.7 (4—13)	6
total	9.8		8.8	
eggs/female	666	5	558	4
first eggs after (days)	3.5		2.0	

produced seems to be influenced by the addition of sugar.

The females deposit their first eggs 1—4 days after emergence from the pupae, provided that they have been fertilized during that period. Otherwise only very few eggs are laid just before the females die, or not laid at all. The eggs are not laid all at the same time, but mostly in two or three batches (first time: 465 eggs, second time: 116, third time: 29, totalling 610 eggs per female (n = 8) over a period of 8 days).

IV. Habitat selection of *T. oleracea* and *T. paludosa.*

The observation area consisted of a meadow, situated along the dike of the Buiten-IJ at Amsterdam (Diemerzeedijk, DZ). The difference in height between the northeast side (dike) and the southwest side (ditch) amounted to about 1.1 m, the distance being 27 m. The length of the meadow (northwest to southeast) was 100 m. Lengthwise the area of investigation could be divided into five strips as to the kind and height of the vegetation. Along the ditch the area was grown over with *Glycera maxima* and some *Phragmites communis,* the vegetation being higher than 60 cm (up to 250 cm) (150 m²). A strip of 20—40 cm high vegetation occurred alongside, mainly consisting of various grasses, mixed up with some *Ranunculus repens,* and *Rumex hydrolapatum* (260 m²). The larger area of the meadow (1360 m²) was densely grown with various grasses, *Trifolium repens* and *Bellis perennis*; the height of this vegetation ranged up to 20 cm. Between this low vegetation and the high vegetation on the dike, a transitional area occurred of 20—40 cm high, grown with various grasses and *Ranunculus acris* (820 m²). The high vegetation on the slope of the dike (40—90 cm) consisted of *Anthriscus sylvestris, Urtica dioica, Cirsium arvense* and various grasses (110 m²).

The meadow was surrounded by a hedge of *Sambucus* and *Crataegus* at the northeast side, *Sambucus* and very high *Urtica* at the northwest side, allotment gardens at the southwest and high trees (*Populus*) at the southeast. So the study area was rather sheltered from the wind. Especially during autumn, the meadow is very wet, the ground

water level being as high as, or even higher than the surface, with the exception of the higher parts and the slope of the dike.

On 9 days between 21 August and 10 September, the numbers of *T. oleracea* and *T. paludosa* were counted in each vegetation type. Counting occurred at noon, during one-and-a-half hour. Meanwhile temperature as well as relative humidity were established in each strip. During this period, adults of both species occurred troughout the study area. The total numbers of specimens observed, subdivided in active and inactive ones, are given in Table 8.

Table 8. The numbers of *T. paludosa* and *T. oleracea* observed

		T. paludosa	T. oleracea
observed	♂	362	59
	♀	65	46
active	♂	160 (44 %)	30 (51 %)
	♀	31 (48 %)	22 (48 %)

The percentual distribution of the numbers of Tipulidae per square metre is given in Table 9. The mean relative humidity and the mean temperature (averaged for the 9 days of observation) at the site in the vegetation where the Tipulidae normally occur, are also given in this table.

Table 9 clearly shows that *T. oleracea* prefers other vegetation types as compared to

Table 9. The distribution of *T. oleracea* and *T. paludosa* over the different vegetation types

Vegetation type	R.H. (%)	temp. (°C)	Distribution (%) of the Tipulidae/m² T. oleracea			T. paludosa		
			♂	♀	total	♂	♀	total
high-dike	48	23	2.7	9.5	5.2	9.1	13.4	10.4
medium-dike	60	22	1.1	5.1	2.5	33.1	11.9	26.7
low	61	21	0.7	3.1	1.5	28.2	4.7	21.4
medium-ditch	56	23	11.5	20.0	14.6	16.2	34.0	21.4
ditch	56	21	84.0	62.4	76.1	13.4	36.0	20.0

T. paludosa. *T. oleracea* was found almost exclusively along the ditch while largest numbers of *T. paludosa* were found in the medium-high and low vegetation types. However, the females of *T. paludosa* clearly deviate from the average picture in this species. These females also occur in large numbers along the ditch. While the *T. paludosa* females, found in the medium-high and low vegetation types were freshly emerged specimens, the females of this species found along the ditch clearly were older (frayed wings; when dead females were found, they were found along the ditch).

The spring generation of *T. oleracea* showed a different distribution over the study

area as compared to the summer generation of this species. In spring large numbers were found both along the ditch and in the high vegetation on the dike. However, in that period the vegetation on the dike was much higher and better developed than during summer because cattle had grazed away most of the vegetation during July.

So, it may be concluded that *T. oleracea* males and females prefer high vegetation, composed of various plant species, and that *T. paludosa* males and young females prefer low vegetations, mainly composed of grasses.

Discussion

The present results concerning the phenology of the species of the subgenus *Tipula* in the Netherlands roughly confirm those of De Jong (1925), Pinchin & Anderson (1936), Brindle (1960), Theowald (1963), and Laughlin (1967). Generally, their results were obtained with light traps whereas in the present study only sweep net catches were involved. The discrepancies in details may be caused by different catching methods.

In some cases *T. paludosa* has been reported flying during May, June and July, which assumedly were specimens from a spring generation (Pinchin & Anderson, 1936). However, in my opinion, it is more likely that these early specimens reflect the variability (although not large in *T. paludosa*) in the length of the fourth larval instar. In *T. oleracea* this variability is rather large (Den Hollander, in press), which is manifest by the long period that adults occur in the populations. Now, the flying period of *T. paludosa* is rather short and occurs only once a year. This suggests that the differences between *T. paludosa* and *T. oleracea* have been caused by a strong selection towards the very long period of the fourth larval instar in the former, causing a smaller variation in flying period duration as well as the fact that it is univoltine.

The phenology of the European species of the subgenus *Tipula* may be summarized as follows:

In the northwestern part of Europe, the subgenus *Tipula* is represented by *T. oleracea, T. paludosa* and *T. czizeki. T. czizeki* is virtually isolated from both other species by flying very late in autumn (October); *T. paludosa* has its flying period in August and September, *T. oleracea* becomes adult during April-June (spring generation) as well as during August and September (autumn generation).

T. oleracea, T. paludosa, T. mediterranea and *T. kleinschmidti* represent the subgenus in the southwestern part of Europe. *T. mediterranea* and *T. kleinschmidti* show main flying periods during April/May and September/October.

Thus only small differences in flying periods occur between *T. paludosa* and both *T. mediterranea* and *T. kleinschmidti.* However, it seems possible that *T. oleracea* is especially numerous during spring, whereas *T. mediterranea* is so during autumn, as was the case in Sardinia (Chapter IIIA). In that case, *T. oleracea* is rather isolated from both *T. paludosa* and *T. mediterranea.*

Another group of the subgenus *Tipula* (*T. italica, T. orientalis* and *T. plumbea,* and again *T. oleracea*) occurs in the southeastern part of Europa. In this group differences in flying period occur between *T. oleracea* and both *T. plumbea* (main flying period October/November) and *T. orientalis* (main flying period May and October). *T. italica* overlaps all other species by flying from August up to November.

However, it is not likely that the above, small, differences in flying periods alone

are sufficient to act as species barrier. Generally, in the beginning of the flying period the numbers of males dominate over those of females, the reverse being true at the end of this period (Chapter III C). Especially in the periods of overlap, females of the one species occur together with males of the other species, while conspecifics are rare. This may heighten the motivation for mating and thus lower the threshold for interspecific matings.

Besides these differences in flying period, differences occur as to the habitat of the species. Brindle (1960) mentions *T. paludosa* having the widest range, its larvae occurring in pasture soil, damp soil, river banks, marsh soil, aquatic moss, as well as in semi-aquatic moss. *T. oleracea* is more restricted in its habitat range, occurring in pasture soil, marsh soil and aquatic moss. The most restricted species, as regards the habitat range, is *T. czizeki*, only occurring in pasture soil and marsh soil. The present study, reveals that *T. paludosa* occurred in both years in large numbers in all localities investigated, whereas *T. czizeki* was found, in reasonable numbers, in only one locality. *T. oleracea*, on the other hand, varied in numbers between the respective localities; in addition the number of generations a year showed to be variable.

These differences, again, decrease the chance that several species occur together. Actually, only the combination *T. oleracea* with *T. paludosa* generally occurs. However, a detailed analysis of the distribution of males and females of both species, again, revealed some differences between them. So, the habitat and the phenology, i.e., ecological factors, contribute, through the accumulation of several slight effects, to the reproductive isolation of the species concerned.

In addition, ethological factors may contribute as well to the species barriers. However, courtship display, if existing at all, does not show to be very specific in the subgenus. Generally, males try to copulate with every other fly, males as well as females. Preliminary observations suggest that, especially by the actions of the females, interspecific matings are prevented in most cases. Nevertheless, under laboratory conditions, crosses have been obtained from *T. paludosa* × *T. czizeki* (reciprocal), *T. oleracea* ♂ × *T. paludosa* ♀ as well as *T. oleracea* ♂ × *T. czizeki* ♀. *T. paludosa* × *T. czizeki* produced fertile offspring (Hemmingsen & Theissen, 1956). The fertility of the offspring of both other crosses could not yet be established. *T. oleracea* seems to mate easily with *T. czizeki,* but the number of trials is still too small. In one case, *T. oleracea* ♂ × *T. czizeki* ♀, larvae emerged from the eggs and grew prosperously, two of them pupated and one emerged but died soon (Den Hollander, unpubl.). Only in one out of many trials a *T. oleracea* male copulated with a *T. paludosa* female, after being highly motivated by the addition of conspecific females (decreased threshold). Out of the eggs laid by the *T. paludosa* female, a few larvae emerged which, however, soon died.

These results suggest that the stronger the ecological isolating mechanisms are, the weaker both the ethological and the post-mating isolating mechanisms operate under laboratory conditions.

Based on the results obtained till now, it may be concluded that *T. paludosa* and *T. czizeki* represent real species, between which any gene-flow is prevented by premating barriers. Similarly, *T. paludosa* and *T. oleracea* are good species, but here both premating and post-mating barriers are involved to prevent gene-flow. The status of *T. oleracea* with respect to *T. czizeki* is not clear yet, because neither premating nor post-mating barriers have been fully successfull to prevent gene-flow.

Summary

The phenology of *Tipula* (*Tipula*) *oleracea* Linnaeus, 1758, *T.* (*T.*) *paludosa* Meigen, 1830, and *T.* (*T.*) *czizeki* De Jong, 1925, have been established on the basis of material from the collection of the Institute of Taxonomic Zoology (Zoological Museum), Amsterdam, and with the aid of field observations and laboratory breedings. Besides, differences in the habitat of the species have been studied.

1. *T. czizeki* occurs in low numbers in a limited number of localities in the Netherlands, during October.

2. *T. paludosa* occurs in large numbers and wide-spread in the Netherlands during the end of August and the beginning of September.

3. *T. oleracea* occurs in a variety of localities in the Netherlands during May/June and August/September (two generations). However, in some localities the numbers vary strongly from year to year and large differences in numbers were found between the spring and the autumn generations, even to such extent, that sometimes only one generation (either spring or autumn) could be established.

4. In a mixed population adults of *T. paludosa* use the habitat in a different way than *T. oleracea.*

5. Including the remaining European species of the subgenus *Tipula,* it can be stated that some differences in flying period do occur; however, on the species level these differences are too small for being effective as species barrier. On the population level, on the contrary, the differences in flying period might be effective, because they are supported by differential use of habitat.

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H. C. BURGER. — Key to the European species of *Brachycaudus*, subgenus *Acaudus* (Homoptera, Aphidoidea), with redescriptions and a note on *B. persicae*, p. 99—116.

Tijdschrift voor Entomologie, deel 118, afl. 5 Gepubliceerd 14.XI.1975

KEY TO THE EUROPEAN SPECIES OF BRACHYCAUDUS, SUBGENUS ACAUDUS (HOMOPTERA, APHIDOIDEA), WITH REDESCRIPTIONS AND A NOTE ON B. PERSICAE

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Abstract

A key is given to the 17 European species of the subgenus *Acaudus* Van der Goot. Three closely related species living on Caryophyllaceae are redescribed, viz., *Brachycaudus* (*Acaudus*) *lychnidis* (Linnaeus, 1758); *Brachycaudus* (*Acaudus*) *klugkisti* Börner, 1942; and *Brachycaudus* (*Acaudus*) *populi* (Del Guercio, 1911). Host alternation of *Brachycaudus persicae* (Passerini, 1860) from *Prunus* to some Scrophulariaceae, was experimentally confirmed.

Introduction

The subgenus *Acaudus* Van der Goot, 1913 is a well-defined group of species, distinct from the other *Brachycaudus* by the presence of a pair of semiglobular or mammiform processes on the anterior part of the mesosternum (mesosternal processes) in apterae and larvae[1]) (Hille Ris Lambers, 1956). Besides, a dark sclerotic dorsal shield is present in apterae viviparae.

Keys to the genus *Brachycaudus* Van der Goot, 1913, were published by Remaudière (1952) and by Shaposhnikov (1964).

Remaudière, in his key, treats ten *Brachycaudus* species from France, of which *B. amygdalinus* (Schout.) belongs to the subgenus *Thuleaphis* H.R.L., 1960, and *B. helichrysi* (Kltb.) to the subgenus *Brachycaudus*. The other species mentioned all belong to the subgenus *Acaudus*. I consider *B. semisubterraneus* C.B. and *B. persicaecola* (Boisd.), and perhaps also *B. mimeuri* Remaud., to be synonyms of *B. persicae* (Pass.). *B. lateralis* (Wlk.) I consider a synonym of *B. cardui* (L.).

Shaposhnikov, in his key, deals with 19 *Brachycaudus* species, two of which are *Appelia* species (*cerinthis* Bozh. and *prunicola* (Kltb.)); two, *amygdalinus* (Schout.) and *rumicicolens* (Patch), belong to the subgenus *Thuleaphis* (syn. *Brevicaudus* Shap.); and three, *salicinae* C.B., *helichrysi* (Kltb.) and *spiraeae* C.B., to the subgenus *Brachycaudus*. The remaining species mentioned by Shaposhnikov fit into the subgenus *Acaudus*, but I do not include *B.* (*A.*) *virgatus* Shap. in my key, because too few samples are available and, therefore, my information about this species is not sufficiently reliable.

In my key to *Acaudus* I add five more species, *iranicus* Davatchi & Remaudière, *populi* (Del Guercio), *lychnicola* H.R.L., *jacobi* Stroyan, and *lamii* (Koch). *B. napelli*

[1]) Only in *Brachycaudus lucifugus* F. P. Müller the mesosternal processes are reduced or absent.
[2]) *"rumicicolens"* is misspelled for *"rumexicolens"*.

(Schrank) and *B. aconiti* (Mordv.) in my opinion are two well defined species and not subspecies of *Brachycaudus napelli* (Schrank), as Shaposhnikov suggests.

There are five *Brachycaudus (Acaudus)* species living on Caryophyllaceae, which appear to be closely related, viz., *Brachycaudus lychnidis* (Linnaeus, 1758), on *Melandryum album,* sometimes on *Silene* sp. (not *S. vulgaris*), exceptionally on *Melandryum rubrum*; *Brachycaudus lychnicola* Hille Ris Lambers, 1966, on *Melandryum rubrum* and *Lychnis flos-cuculi; Brachycaudus klugkisti* (Börner, 1942), on *Melandryum rubrum,* sometimes on *M. album; Brachycaudus populi* (Del Guercio, 1911), on *Silene vulgaris*; and *Brachycaudus divaricatae* Shaposhnikov, 1956, on *Prunus* spp. and perhaps on *Melandryum* sp.

I redescribe *Brachycaudus lychnidis* (L.), *Brachycaudus klugkisti* Börner and *Brachycaudus populi* (Del Guercio), because the original descriptions are very short and incomplete. The original description of *Brachycaudus divaricatae* Shaposhnikov, 1956, is also very short and incomplete. Only few samples of this species were available. The life history of this species is not quite clear. From the examined samples from Remaudière and Van den Bosch it became apparent that sexuales are formed in May on *Prunus*. This makes host alternation to *Melandryum*, as suggested by Shaposhnikov, not very likely.

KEY TO THE EUROPEAN SPECIES OF *Brachycaudus,* SUBGENUS *Acaudus*

(Apterae viviparae not fundatrices, unless mentioned otherwise)

1. Dorsum on abdominal tergites I—IV or I—V only in the middle with a small, continuous, dark, spinal blotch having an irregularly shaped margin; mesonotum with an irregularly shaped, dark, spino-pleural transverse bar. Spinal hairs on abdominal tergite III, and also most other hairs on the abdominal tergites anterior to siphunculi, about 0.6—1.7 times as long as the basal diameter of antennal segment III. Longest hairs on abdominal tergite VIII longer than the basal diameter of antennal segment III. Length of last segment of rostrum 0.140—0.165 mm. Rhinaria on antennal segment III usually absent. Siphunculi with or without imbrications. On *Anchusa italica.* Southeast Europe and Southwest Asia . . . . . *B. iranicus* Davatchi & Remaudière

— Dorsum either with the dark sclerotic shield much larger, continuously extending over the greater part of the tergum; or when the dark dorsal shield is reduced, desintegrated into small blotches or transverse bars; this dark dorsal shield fused or not with the transverse bar on mesonotum 2

2. Spinal hairs on abdominal tergite III and also most other hairs on the abdominal tergites anterior to siphunculi more than 0.8 times the basal diameter of antennal segment III 3

— Spinal hairs on abdominal tergite III and also most other hairs on the abdominal tergites anterior to siphunculi 0.8 times as long as the basal diameter of antennal segment III or shorter 8

3. Siphunculi smooth, 1.0—1.3 times as long as second joint of hind tarsi. Processus terminalis 2.8—4.0 times as long as base of antennal segment VI. First tarsal joint of hind tarsi usually with 2 hairs. In apterae viviparae antennal segment III with

rhinaria; and hind tibiae mostly with a few pseudosensoria. On *Aconitum*. Europe . . . . . *B. napelli* (Schrank)

— Siphunculi with imbrications 4

4. Siphunculi 1.6—2.4 times length of second joint of hind tarsi. Processus terminalis 2.5—3.5 times as long as base of antennal segment VI. Spinal hairs on abdominal tergite III not more than about 1.3 times as long as basal diameter of antennal segment III. On *Aconitum*. Central and Southern Europe . *B. aconiti* (Mordv.)

— Siphunculi shorter, 0.7—1.5 times length of second joint of hind tarsi. Processus terminalis mostly longer, 3.5—6.0 times as long as base of antennal segment VI. Spinal hairs on abdominal tergite III usually longer, 1.1—3.4 times as long as basal diameter of antennal segment III 5

5. Last segment of rostrum 0.8—1.0 times as long as second joint of hind tarsi.[1]) Stigmal pori small with a thick, rather heavy sclerotic rim; second joint of hind tarsi 5.2—7.2 times as long as the greatest inner diameter of the stigmal porus of abdominal segment I. On *Silene vulgaris*. Europe . . *B. populi* (Del Guercio)

— Last segment of rostrum 1.2—1.6 times as long as second joint of hind tarsi . 6

6. Spinal hairs on abdominal tergite III like most other hairs on the abdominal tergites anterior to the siphunculi, 1.9—3.4 times as long as longest hairs on antennal segment III. Longest hairs on antennal segment III 0.017—0.029 mm long, 0.8—1.3 times basal diameter of the segment. Hairs on abdominal tergites anterior to siphunculi mostly blunt or knobbed, sometimes pointed. Number of hairs on antennal segment III (7—15) mostly smaller. On *Melandryum rubrum*, sometimes on *M. album*. Europe . . . . . *B. klugkisti* (Börner)

— Spinal hairs on abdominal tergite III, like most other hairs on the abdominal tergites anterior to siphunculi, 0.7—1.4 times as long as longest hairs on antennal segment III; longest hairs on antennal segment III 1.1—3 times basal diameter of the segment. Hairs on abdominal tergites in front of siphunculi mostly pointed or with thread-like apices, sometimes blunt. Number of hairs on antennal segment III (13—34) mostly greater 7

7. Hairs on antennal segment III and spinal hairs on abdominal tergite III like the other hairs on the abdominal tergites with long, thread-like apices. Base of antennal segment VI 1.0—1.7 times as long as the spinal hairs on abdominal tergite III. About 20—34 hairs on antennal segment III. Length of last segment of rostrum 0.181—0.208 mm. On underground parts and on parts of the plants just above soil surface. On *Melandryum rubrum* and *Lychnis flos-cuculi*. Bennekom (Netherlands) . . . . . *B. lychnicola* H.R.L.

— Hairs on antennal segment III generally pointed, sometimes blunt or with short thread-like apices. Spinal hairs on abdominal tergite III and also most other hairs on the abdominal tergites anterior to siphunculi mostly pointed, sometimes blunt. Base of antennal segment VI 1.7—3.6 times as long as the spinal hairs on

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[1]) Not keyed because of too few samples available: *B. divaricatae* Shap. This species has last segment of rostrum about 0.9—1.2 times as long as second joint of hind tarsi. It looks distinct from *B. populi* (Del Guercio) by the relatively larger stigmal pori and shorter second joint of hind tarsi, the latter being 3.2—4.4 times as long as the greatest inner diameter of the stigmal porus of abdominal segment I. From *B. lychnidis* (L.) and *B. lychnicola* H.R.L. it differs by the shorter last segment of rostrum (0.147—0.176 mm), from *B. klugkisti* (Börner) by the longer hairs on antennal segment III (longest of these hairs 0.029—0.050 mm long).

abdominal tergite III. About 13—25 hairs on antennal segment III. Length of last segment of rostrum 0.185—0.210 mm. Usually living in the tops of the plants. On *Melandryum album,* sometimes on *Silene,* exceptionally on *Melandryum rubrum.* Europe . . . . . *B. lychnidis* (L.)

8. Marginal tubercles present on meso- and metathorax, and abdominal tergite VII; and spinal tubercles present on abdominal tergites VII and VIII. These tubercles may be wanting partly on one or both sides. On (*Lindelofia*), *Cynoglossum,* and *Cerinthe.* Europe and Madeira . . . . *B. bicolor* (Nevsky) sensu Stroyan

— Marginal tubercles absent on mesothorax; and spinal tubercles absent on abdominal tergites VII and VIII. Marginal tubercles mostly absent on metathorax and abdominal tergite VII 9

9. Longest hairs on abdominal tergite VIII more than 2 times as long as basal diameter of antennal segment III 10

— Longest hairs on abdominal tergite VIII 2 times as long as basal diameter of antennal segment III or shorter 15

10. Cauda with more than 10 hairs. Length of last segment of rostrum 0.170—0.190 mm. Processus terminalis 2.5—3.5 times as long as base of antennal segment VI. On *Aconitum.* Central and Southern Europe . . . . *B. aconiti* (Mordv.)

— Cauda with less than 10 hairs 11

11. Length of last segment of rostrum 0.180—0.225 mm. Transverse rows of imbrications on the abdominal tergites anterior to the siphunculi indistinct or almost absent. Mesosternal processes conspicuous, semi-globular. On *Prunus,* Compositae and Boraginaceae. Europe to Central Asia, North America . . . *B. cardui* (L.)

— Length of last segment of rostrum 0.125—0.175 mm. Transverse rows of imbrications on the abdominal tergites in front of siphunculi distinct. Mesosternal processes less conspicuous, less elevated 12

12. Processus terminalis more than 3.5 times as long as base of antennal segment VI 13

— Processus terminalis 3.5 times as long as base of antennal segment VI or less . 14

13. Apterae viviparae usually without rhinaria on antennal segment III. Alatae viviparae with rhinaria on antennal segments III, IV, and usually a few sec. rhinaria on antennal segment V. Length of last segment of rostrum 0.130—0.165 mm. On *Prunus, Amygdalus, Euphrasia, Melampyrum* and *Rhinanthus.* Almost world-wide . . . . . *B. persicae* (Pass.)

— Apterae viviparae (and oviparae) always with rhinaria on antennal segment III. Alatae viviparae with rhinaria on antennal segment III and often a few rhinaria on antennal segment IV. Processus terminalis 4—6 times as long as base of antennal segment VI. Length of last segment of rostrum 0.140—0.175 mm. On *Myosotis* and *Pulmonaria.* Western and Central Europe . . . . *B. jacobi* Stroyan

14. Longest hairs on ventral part of hind femora longer than basal diameter of antennal segment III; these hairs mostly with thread-like apices. Processus terminalis 2—3 times as long as base of antennal segment VI. Length of last segment of rostrum 0.125—0.145 mm. On *Lamium.* Central and Eastern Europe . *B. lamii* (Koch)

— Longest hairs on ventral part of hind femora shorter than basal diameter of antennal segment III. All hairs on ventral part of hind femora pointed or blunt. Processus terminalis 3—5.5 times as long as base of antennal segment VI. Length of last segment of rostrum 0.130—0.165 mm. On *Prunus, Amygdalus, Euphrasia, Melampyrum* and *Rhinanthus.* Almost world-wide . . . *B. persicae* (Pass.)

15. More than 10 hairs on abdominal tergite VIII, which are arranged in two or three more or less irregular transverse rows; these hairs are shorter or at the most about as long as basal diameter of antennal segment III. Processus terminalis 2.5—3.5 times as long as base of antennal segment VI 16
— Less than 10 hairs on abdominal tergite VIII, which usually are arranged in one regular transverse row 17
16. Length of last segment of rostrum 0.135—0.160 mm. Cauda with about 10—16 hairs. Alatae viviparae with rhinaria on antennal segments III, IV and usually a few sec. rhinaria on antennal segment V. On *Linaria.* Western and Central Europe . . . . . *B. linariae* Stroyan
— Length of last segment of rostrum 0.165—0.185 mm. Cauda with about 5—9 hairs. Alatae viviparae with rhinaria on antennal segment III and usually a few rhinaria on antennal segment IV. On *Malva.* England, Russia, Spain . *B. malvae* Shap.[1])
17. Longest hairs on antennal segment III very thin and short (length ca. 0.004 mm) 0.2 times as long as the basal diameter of this segment. Length of last segment of rostrum 0.140—0.165 mm. The rim of the stigmal pori indented on anterior margin. Mesosternal processes reduced or absent. On *Plantago lanceolata.* Europe . . . . . *B. lucifugus* F. P. Müller
— Longest hairs on antennal segment III not so very thin and short, at least 0.006 mm long, 0.3 or more times as long as the basal diameter of this segment. The rim of the stigmal pori hardly or not indented on anterior margin, more or less rounded. Mesosternal processes distinct 18
18. Length of last segment of rostrum 0.125—0.145 mm. Processus terminalis 2—3 times as long as base of antennal segment VI. On *Ballota.* Eastern Europe . . . . . *B. ballotae* (Pass.)
— Length of last segment of rostrum 0.165—0.225 mm 19
19. Longest hairs on abdominal tergite VIII at least 0.023 mm long, 0.8 or more times as long as the basal diameter of antennal segment III. Mesosternal processes conspicuous, semi-globular. Length of last segment of rostrum 0.180—0.225 mm. Apterae viviparae normally not with rhinaria on antennal segment III. On Compositae, Boraginaceae and *Prunus.* Europe to Central Asia, North America . . . . . *B. cardui* (L.)
— Longest hairs on abdominal tergite VIII 0.006—0.018 mm long, 0.3—0.7 times as long as the basal diameter of antennal segment III. Mesosternal processes less conspicuous, less elevated. Length of last segment of rostrum 0.165—0.195 mm. Apterae viviparae frequently with rhinaria on antennal segment III. On *Echium* and *Anchusa.* Central and Eastern Europe . . . . *B. mordvilkoi* H.R.L.

Brachycaudus (Acaudus) lychnidis (Linnaeus, 1758)

Aphis lychnidis Linnaeus, 1758: 451.

Linnaeus left no aphid material. The original description is fragmentary. Therefore I give a redescription of the species here.

[1]) Characteristics possibly not wholly reliable because too few samples are available.

Material examined: Besides the material mentioned under measurements, I have examined specimens from *Lychnis alba,* Portici (Italy), 9.III.1934, leg. D. Roberti; from *Melandryum album,* Antona near Massa (Italy), 1.IX. 1963, leg. D.H.R.L.; and from *Melandryum album,* Lido (Venice) (Italy), 6.VI.1965, leg. D.H.R.L.; all in the collection of D. Hille Ris Lambers.

Fundatrix.

Antennae about 0.5—0.6 of length of body, segment III with only about 9 hairs; processus terminalis about 2.5 times as long as basal part of segment VI. Last segment of rostrum 0.155—0.168 mm long, about 1.2 times as long as second joint of hind tarsi. Siphunculi about 0.07 of length of body. Proportions between length of longest hairs on antennal segment III and basal diameter of that segment, between length of spinal hairs of abdominal tergite III and basal diameter of antennal segment III, between length of spinal hairs of abdominal tergite III and length of longest hairs on antennal segment III, and between distances between stigmal pori of abdominal segments I, II and III, about as in apterous viviparous female. Other characters also similar to apterous viviparous female.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	2.32	1.22	0.30	0.18	0.20	0.12+0.27	0.16	0.10
2	2.34	1.22	0.32	0.18	0.20	0.11+0.27	0.16	—
3	2.27	1.13	0.29	0.15	0.18	0.10+0.28	0.16	0.09

(1—3, from *Melandryum album,* Arcen (L.) (Netherlands), 3.IV.1967, leg. D.H.R.L.)

Apterous viviparous female.

In life dorsally shiny black with the underside red-brown. In mounted specimens body broadly oval, about 1.75—2.85 mm long. Front sinuated; median frontal tubercle about as high as lateral frontal tubercles. Antennae about 0.6—0.8 of length of body, with segments I and II dark, flagellum from the pale segment III gradually darker towards the base of segment VI; processus terminalis gradually slightly paler towards apex; segment III for the greater part almost smooth, with only at base rather distinct imbrications, sometimes also in later generations than the second with a few rhinaria, and with 13—25 hairs; the latter generally pointed, sometimes blunt, or with filamentary apices, longest 0.032—0.053 mm and 1.1—2.1 times basal diameter of the segment; processus terminalis 4—5.5 times as long as base of segment VI; this base 1.7—3.6 times as long as spinal hairs of abdominal tergite III. Tip of rostrum generally reaching past hind coxae; last segment 0.185—0.210 mm long, 1.3—1.6 times as long as second joint of hind tarsi, 4.3—7.8 times as long as the greatest inner diameter of the stigmal porus of abdominal segment I, with 8—14 accessory hairs. Mesosternal processes rather low and extensive, in mounted specimens mostly somewhat confluent. Tergum dark sclerotic, with metanotum fused with abdominal tergites I to VI, tergites VII and VIII free; dorsal shield quite smooth, generally not touching the stigmal

plates. Spinal tubercles absent; marginal tubercles usually present on abdominal segments II, III and IV, often also on I and sometimes on metathorax, all rather or very small, and flat or semi- globular. Hairs on abdominal tergites cephalad siphunculi mostly pointed, sometimes blunt; spinal haris of tergite III 0.034—0.055 mm long, 1.1—2.0 times as long as basal diameter of antennal segment III and 0.7—1.4 times as long as longest hairs on antennal segment III. Tergite VIII with 6—12 hairs, mostly with filamentary apices, sometimes pointed, mostly placed in a row on posterior margin of sclerotic part of segment; longest of these hairs 0.08—0.12 mm long, 3—5 times as long as basal diameter of antennal segment III. Siphunculi dark, truncated conical, often slightly constricted at base, where they are about twice as wide as in very distinct annular incision below flange, about 0.08 of length of body and 1.0—1.5 times length of second joint of hind tarsi, with rather straight imbrications; flange wide, about 1.4 times as wide as width in subapical incision. Cauda rounded or semi-oval, about 1.5 times as wide at base as its length, with about 11—17 hairs. Legs with fore femora pale with dorsally dark apex, middle femora smoky with dorsally dark apex, or dark with pale base; the hind femora dark with pale base; tibiae pale with apex and the very base dark; first tarsal joints with 3, 3, 3 hairs.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	2.28	1.46	0.38	0.24	0.17	0.10+0.41	0.18	0.10
2	1.89	152	0.37	0.24	0.18	0.09+0.49	0.17	0.08
3	2.30	1.69	0.43	0.26	0.18	0.10+0.55	—	0.10
4	2.62	1.86	0.51	0.33	0.22	0.10+0.53	0.23	0.11
5	2.64	1.61	0.41	0.28	0.21	0.10+0.45	0.21	0.11
6	2.34	1.59	0.40	0.27	0.17	0.09+0.49	0.22	0.11
7	2.23	1.41	0.31	0.21	0.16	0.10+0.48	0.17	0.10

(1, from *Melandryum album,* Andalucia la Nueva (And.) (Spain), I.IV.1968, leg. D.H.R.L.; 2, from *Silene vulgaris* (?), Cascais (Portugal), 6.VI.1965, leg. Oliveira; 3, from *Melandryum album,* St. Georges (France), 3.14.VI.1947, leg. Kruseman; 4, from *Melandryum album,* Arcen (L.) (Netherlands), 7.VII.1966, leg. D.H.R.L.; 5, from *Melandryum album,* Arcen (L.) (Netherlands), 27.IX.1966, leg. D.H.R.L.; 6, from *Silene dichotoma,* Poznán (Poland), 17.VII.1966, leg. Achremowicz; 7, from *Melandryum album,* Merano (Italy), 6.VIII.1930, leg. D.H.R.L.)

Alate viviparous female.

In mounted specimens head and thorax dark, abdomen with a dark spino-pleural sclerite extending from abdominal tergites III to VI; sclerite fused with marginal sclerites of segments V and VI; marginal sclerites of segment III each with 7—12 hairs. Antennae dark, just shorter than to about as long as body; segment III along one side with about 15—34 flat rhinaria of various sizes; segment IV with 0—4 rhinaria along one side; antennal segment III with about same number of hairs as in apterae viviparae, hairs generally pointed or blunt, sometimes slightly knobbed, the longest

0.025—0.038 mm, 0.9—1.6 times basal diameter of segment. Spinal hairs of abdominal tergite III 0.026—0.044 mm long, 1.0—1.7 times as long as basal diameter of antennal segment III, and 0.8—1.5 times as long as longest hairs on that segment. Hairs on tergite VIII about as in apterae viviparae. Wings with normal venation; veins light brown, subcosta pale, stigma rather dark. Other characters about as in apterae viviparae.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhinaria on III	IV	Siph.	Cau.
1	2.44	1.99	0.49	0.34	0.25	0.12+0.64	24 & 25	0 & 0	0.18	0.11
2	2.17	1.89	0.47	0.34	0.24	0.11+0.57	24 & 26	0 & 0	0.18	0.11
3	2.03	2.06	0.49	0.34	0.24	0.13+0.71	18 & 22	0 & 1	0.19	0.10
4	1.83	1.78	0.43	0.25	0.21	0.10+0.65	16 & 16(?)	0 & 0	0.15	0.11
5	2.21	1.97	0.50	0.33	0.26	0.12+0.61	28 & —	0 & —	0.21	—
6	2.11	1.97	0.51	0.34	0.25	0.11+0.61	23 & 28	0 & 1	0.18	0.10

(1 and 2, from *Melandryum album,* Andalucia la Nueva (And.) (Spain), 1.IV.1968, leg. D.H.R.L.; 3 and 4, from *Silene vulgaris*(?), Cascais (Portugal), 6.VI.1965, leg. Oliveira; 5, from *Melandryum album*, Arcen (L.) (Netherlands), 7.VII.1966, leg. D.H.R.L.; 6, from *Melandryum album*, Arcen (L.) (Netherlands), 4.V.1967, leg. D.H.R.L.)

Oviparous female.

In life colour about as in apterae viviparae, but hind tibiae wholly dark. In mounted specimens body generally smaller than in apterae viviparae, about 1.75-2.35 mm long. Tergum with a light-brown spino-pleural blotch extending from abdominal tergites I to IV, in the mid dorsal line less, or partly not, sclerotized, generally more or less fused with tergite V, and not reaching equally dark marginal sclerites; tergites VI and VII with irregular light-brown spino-pleural transverse bars; spino-pleural bar on tergite VIII darker. Hind tibiae wholly brown with the apex and the very base slightly darker, on basal half rather incrassate and mainly there with about 40—120 pseudosensoria. Antennal segment III with 10—15 pointed hairs. Other characters about as in apterous viviparous female.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	2.32	1.33	0.28	0.21	0.17	0.09+0.43	0.18	0.09
2	2.25	1.23	0.26	0.20	0.16	0.08+0.42	0.16	0.10
3	1.97	1.14	0.24	0.17	0.14	0.08+0.40	0.17	0.08
4	1.89	1.10	0.21	0.17	0.15	0.08+0.38	0.16	0.08
5	1.87	1.13	0.22	0.17	0.15	0.07+0.41	0.16	—

(1—5, from *Melandryum album,* Arcen (L.) (Netherlands); 1—2, 27.IX.1966; 3, 3.X.1966; 4, 7.X.1966; 5, 10.X.1966; all leg. D.H.R.L.)

Apterous male.

In life black. In mounted specimens body more slender than in alatae viviparae, about 1.50—1.85 mm long. Anterior part of head dark sclerotic, posterior part of head, and the thorax paler, abdomen with a more or less solid, rather dark sclerotic, blotch extending from tergites I through VI, with local perforations between the tergites; this blotch fused with marginal sclerites of segments III to VI. Antennae shorter than body, as dark as head; rhinaria along one side, on segment III about 13—20, on segment IV about 7—15 and on segment V about 4—9 secondary rhinaria. Siphunculi slightly tapering. Other characters about as in alate viviparous female. Genitalia normal.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhin. on segments III	IV	V	Siph.	Cau.
1	1.82	1.50	0.37	0.27	0.18	0.09+0.43	19 & 13	7 & 11	8 & 5	0.12	0.07
2	1.66	1.35	0.34	0.24	0.16	0.07+0.41	16 & 19	10 & 15	6 & 8	0.11	0.06
3	1.60	1.30	0.30	0.23	0.16	0.08+0.39	19 & 20	13 & 10	9& 5	0.11	—
4	1.67	1.37	0.32	0.26	0.17	0.07+0.42	19 & 17	9 & 11	8 & 4	0.11	0.07

(1—4, from *Melandryum album,* Arcen (L.) (Netherlands); 1, 27.IX.1966; 2, 3.X.1966; 3, 7.X.1966; 4, 10.X.1966; all leg. D.H.R.L.)

Brachycaudus (Acaudus) klugkisti (Börner, 1942)

Acaudus klugkisti Börner, 1942: 260.

Through the kind help of Dr. Petersen, Deutsches Entomologisches Institut, Eberswalde, Germany, I could examine the Börner types of *Brachycaudus klugkisti.* They all seem to be part of a culture on *Melandryum rubrum,* started from material from Waldau, with dates 4.VI.1942 to July 1942.

The slides are labelled as follows:

a. "Acaudus klug-/kisti CB. 1942/Typen (a)" on a red label and "Melandr rubrum/ Waldau-Ost/4.6.42/A. klugkisti" on a white label.
b. "Acaudus klug-/kisti CB. 1942/Typen (b)" on a red label and "Melandr rubrum/ Waldau/5.6.42/Zucht Labor/10.6.42" on a white label.
c. "Acaudus/klugkisti CB/1942/Typen (c)" on a red label and "Melandr rubrum/ Zucht Labor von/Waldau-Heide-/teich 20.6.42/A. klugkisti" on a white label.
d. "Acaudus/klugkisti/CB. 1942/Typen (d)" on a red label and "Melandr rubr/Zucht aus Waldau/Juli 1942/A. klugkisti" on a white label.

It is not clear which "Waldau" is meant with this indication on the labels, since I found 9 localities in Germany with the name Waldau. Börners manuscript with the description of *A. klugkisti* Börner, 1942 was finished between April and June 1942; the locality mentioned on the type slides is not mentioned in his description. The collecting dates suggest that the "types" were not available when he made his description, and thus do not have the status of types. It is also interesting that Börner's paper mentions only apterae, but part of the types are alatae. It is remarkable that the apterae in the type slides in one respect do not at all agree with the description. Börner indicates that the hairs on the tergites mostly are shorter than similar hairs in *Brachycaudus lychnidis*. ("Die länge der Rückenborsten ist bei *klugkisti* durchweg etwas kürzer als bei *lychnidis*"). Actually the reverse is the case.

Börner did not indicate a holotype. Therefore I selected the lowest specimen of the apterae viviparae in slide (d), (Deutsch. Entomol. Institut Coll. Carl Börner 26/55) as neotype. The labelling is described above. The other specimens in the slides (a), (b), (c) and (d) (resp. Deutsch. Entomol. Institut Coll. Carl Börner 26/52, 26/53, 26/54 and 26/55) do not have any type status. A slide labelled "Acaudus/klugkisti CB./1942/Cotypen" on a red label and "Melandr. rubr. Zucht 806/♀ ♀Nbg/8.5.43" on a white label I have left out of consideration.

Material examined: The material mentioned under measurements, except the "types", all in the collection of D. Hille Ris Lambers (from *Melandryum rubrum,* Meppel (Netherlands), 19.V.1965, leg. P.D., partly in the collection of the Plant Protection Service). The "types" are in the Deutsches Entomologisches Institut, Eberswalde (Germany). Further material I have examined from *Melandryum album,* Ouddorp (Netherlands), 28.VI.1965, leg. v. d. Bund (in coll. D. Hille Ris Lambers and in coll. Plant Protection Service) and from *Lychnis* (?), Burgst (Netherlands), VI.1928, leg. Roepke (in coll. D. Hille Ris Lambers).

Fundatrix.

Antennae about 0.4—0.5 of length of body, of 5 segments; processus terminalis 2.5—3.5 times as long as basal part of segment VI. Distance between stigmal opercula of abdominal segments I and II about 2/3 of distance between stigmal opercula of segments II and III. Siphunculi about 0.06—0.065 of length of body. Other characters about as in apterous viviparous female.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	Siph.	Cau.
1	2.01	0.91	0.30	0.13	0.10+0.27	0.13	0.10
2	2.23	1.07	0.35	0.15	0.11+0.33	0.14	0.11

(1—2, from *Melandryum rubrum,* Wageningen (Netherlands), 17.IV.1943, leg. D.H.R.L.)

Apterous viviparous female.

In life dorsally shiny black with the underside red-brown. In mounted specimens body

oval, about 1.50—2.45 mm long. Front sinuated, median frontal tubercle a little higher than lateral frontal tubercles. Antennae about 0.5—0.7 of length of body, segment I rather dark, segment II paler, flagellum from the pale segment III gradually darker towards the base of segment VI; processus terminalis gradually slightly paler towards apex; segment III strikingly narrowed at base with distinct imbrications over about its whole length, without rhinaria and with 7—15 hairs; the latter generally pointed, sometimes blunt or knobbed with an oblong knob; longest of these hairs 0.017—0.029 mm long and 0.8—1.3 times basal diameter of segment; processus terminalis 4—6 times as long as base of segment VI. Tip of rostrum reaching hind coxae; last segment 0.143—0.172 mm long, 1.2—1.5 times as long as second joint of hind tarsi, with 6—10 accessory hairs. Mesosternal processes low and not conspicuous. Tergum dark sclerotic with mesonotum mostly not completely fused with the dorsal shield formed by metanotum and tergites I to VII; tergite VIII free; dorsal shield quite smooth, without reticulations, generally also fused with the stigmal plates. Spinal tubercles absent, marginal tubercles often present on abdominal segments II, III and IV, small and semi-globular. Hairs on abdominal tergites cephalad siphunculi mostly blunt, or knobbed with an oblong knob, sometimes pointed. Spinal hairs of tergite III 0.042—0.065 mm long, 1.9—3.4 times as long as basal diameter of antennal segment III and 1.9—3.4 times as long as longest hairs on antennal segment III. Tergite VIII with the 6—8 hairs pointed or with filamentary apices; mostly placed in a row on posterior margin of sclerotic part of segment; longest of these hairs 0.07—0.10 mm, 3—5 times as long as basal diameter of antennal segment III. Siphunculi dark, truncated conical, sometimes slightly constricted at base, and there 1.5—2 times as wide as in very distinct annular incision below flange, about 0.07 of length of body and 1.0—1.5 times length of second joint of hind tarsi, with rather straight imbrications; flange wide, about 1.4 times as wide as in subapical incison. Cauda rounded, about 1.2 times as wide at base as its length, with about 6—12 hairs. Legs with fore femora pale, middle femora pale or smoky, hind femora smoky to blackish; tibiae pale with apex slightly darker; first tarsal joints with 3, 3, 3 hairs or with 3, 3, 2 hairs (types with only 2 hairs on first joint of hind tarsi).

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	1.90	1.15	0.25	0.16	0.12	0.08+0.43	0.14	—
2	±1.50	0.99	0.21	0.14	0.08	0.08+0.37	0.12	±0.07
3	2.21	1.27	0.28	0.19	0.13	0.09+0.45	0.16	0.10
4	1.78	1.00	0.21	0.12	0.11	0.07+0.37	0.13	0.10
5	1.65	0.79	0.13	0.10	0.08	0.06+0.31	0.10	0.08
6	1.85	1.07	0.22	0.13	0.12	0.08+0.40	0.14	0.08
7	2.39	1.51	0.37	0.22	0.17	0.09+0.49	0.18	0.12
8	2.15	1.39	0.31	0.19	0.13	0.09+0.51	0.17	0.10

(1, from *Melandryum rubrum,* Waldau (Germany), VII.1942, leg. Börner (neotype); 2, from *Melandryum rubrum,* Waldau (Germany), VII.1942, leg. Börner, ("type" series); 3, from *Melandryum rubrum,* Waldau (Germany), 4.VI.1942, leg. Börner

("type" series); 4, from *Melandryum rubrum,* Laren (N.H.) (Netherlands), 6.VII. 1930, leg. D.H.R.L.; 5, from *Melandryum rubrum,* Houthem (L.) (Netherlands), 24.VI.1946, leg. D.H.R.L.; 6, from *Melandryum rubrum,* Bennekom (Netherlands), 30.V.1965, leg. D.H.R.L.; 7, from *Melandryum rubrum,* Meppel (Netherlands), 19.V.1965, leg. P.D.; 8, from *Melandryum album,* Flynn Dyke (Cambs.) (England), 11.VII.1964, leg. D.H.R.L.)

Alate viviparous female.

In mounted specimens head and thorax dark, abdomen with a dark spino-pleural sclerite extending from tergites III to VII; this blotch fused with the marginal sclerites of segments V and VI and more or less with the marginal sclerites of segment IV; marginal sclerites of segment III with 4—9 hairs each. Antennae dark, just shorter than body; segment III along one side with 11—31 rhinaria of various sizes with slightly elevated rim, and membrane bulging with flat top; segment IV with 0—3, exceptionally up to 8, rhinaria along one side. Spinal hairs of abdominal tergite III shorter than in apterae, 0.033—0.050 mm long, 1.5—2.2 times as long as basal diameter of antennal segment III and 1.5—2.4 times as long as longest hairs on antennal segment III; antennal hairs about as in apterae viviparae; hairs on abdominal tergite VIII slightly shorter than in apterae viviparae, viz., longest of these hairs 0.065—0.08 mm long, 2.5—4 times as long as basal diameter of antennal segment III. Wings with normal venation, the veins light brown, both subcosta and stigma rather pale, along all the veins with an equally narrow, distinct light brownish border. Other characters about as in apterae viviparae.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhin. on III	IV	Siph.	Cau.
1	1.71	1.62	0.39	0.22	0.17	0.11+0.59	12 & 11	0 & 0	0.13	0.09
2	±1.73	1.67	0.38	0.26	0.17	0.10+0.63	14 & 15	0 & 0	0.14	—
3	2.03	1.94	0.49	0.31	0.21	0.11+0.68	22 & 20	0 & 0	0.16	0.11
4	2.08	1.95	0.48	0.30	0.20	0.12+0.71	21 & 23	2 & 2	0.17	0.11
5	2.11	1.92	0.51	0.30	0.21	0.11+0.66	21 & 19	1 & 1	0.15	0.10
6	2.19	1.91	0.50	0.32	0.22	0.11+0.61	— & 28	1 & 2	0.18	0.11

(1 and 2, from *Melandryum rubrum,* Waldau (Germany), VII.1942, leg. Börner ("type"series); 3, from *Melandryum rubrum,* Waldau (Germany), 5.VI.1942 to 10.VI. 1942, leg. Börner ("type"series); 4, from *Melandryum rubrum,* Bennekom (Netherlands), 30.V.1965, leg. D.H.R.L.; 5, from *Melandryum rubrum,* Meppel (Netherlands), 19.V.1965, leg. P.D.; 6, from *Melandryum album,* Flynn Dyke (Cambs.) (England), 11.VII.1964, leg. D.H.R.L.)

Oviparous female.

In mounted specimens tergum wholly dark sclerotic, head and most of thorax paler, about as in apterae viviparae. Hind tibiae conspicuously incrassate in middle, and there with 20—45 pseudosensoria. Antennae with 5 or 6 segments. Spinal hairs of abdominal

tergite III 0.050—0.055 mm long, with a very conspicuous knob; these hairs 2.7—3.7 times as long as basal diameter of antennal segment III and 3.6—4.3 times as long as longest hairs on antennal segment III. Other characters about as in apterous viviparous female.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	1.73	0.89	0.17	0.11	0.10	0.08+0.32	0.11	0.08
2	1.46	0.65	0.17	0.08	0.08+0.24	—	0.11	0.08
3	1.52	0.89	0.15	0.12	0.10	0.07+0.34	0.11	0.08

(1—3, from *Melandryum rubrum,* Wageningen (Netherlands), 19.X.1943, leg. D.H.R.L.)

Apterous male.

In mounted specimen body about as slender as in alatae viviparae. Head for the greater part, and tergum wholly dark sclerotic, thorax paler. Antennae with 5 segments, as dark as the head. Rhinaria along one side of segments III to V. Spinal hairs of abdominal tergite III 0.036 mm long, 2.4 times as long as basal diameter of antennal segment III and 3.0 times as long as longest hairs on antennal segment III. Siphunculi distinctly tapering. Femora pale, tibiae smoky. Other characters about as in alate viviparous female. Genitalia normal.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	Rhin. on segments III	IV	V	Siph.	Cau.
1	1.01	0.82	0.27	0.09	0.07+0.30	22 & 20	3 & 4	1 & 1	0.07	0.06

(1, from *Melandryum rubrum*, Wageningen (Netherlands), 19.X.1943, leg. D.H.R.L.)

Brachycaudus (Acaudus) populi (Del Guercio, 1911)

Anuraphis populi Del Guercio, 1911: 307.

Prof. Dr. M. Martelli, Milano, most kindly permitted the loan of the Del Guercio material of *Anuraphis populi*. This consisted of three slides, which are labelled as follows:

"*Anuraphis*/*populi*/Del Gu/deleted/apt. populea/Kalt." on a white label and "deleted/*Populus nigra*/Spagna/n. 56" in ink on a white label. This is slide 15/54 on a typed label on the back of the slide in the Del Guercio collection, Milano.

"*Anuraphis*/*populi*/del Guercio/paralectotype/Det: del Guercio" on a white label and "*Populus nigra*/Spagna/no. 56/Remounted 1967/by H.R.L. from slide/15/54" on a white label.

"*Brachycaudus/populi*/del Guercio/*paratype*/Det. del Guercio" on a red label and "N. Spain/Pl. Populus nigra/Loc.?/Date?/Leg.?/Remounted 1967/by H R L from 56/slide 15/54" on a white label.

Del Guercio did not indicate types. Therefore I have selected the middle specimen of the first mentioned slide as lectotype, indicated on a label on the backside as "lectotype H. C. Burger, 1974". The remaining Del Guercio specimens I consider paralectotypes.

It is unlikely that the collector (I.S. Tavares) should have found this *Silene*-inhabiting species on *Populus nigra*. As Dr. D. Hille Ris Lambers pointed out, the host plant record by Del Guercio is the result of a mix-up. Del Guercio (1911) recorded *Anuraphis populi* from *Populus nigra* but this aphid is restricted to *Silene inflata* (= *vulgaris*). In his list on p. 298 this is followed by *Pemphigus inflatae* n. sp. from *Silene inflata,* but this aphid is *Pemphigus spyrothecae* Pass., and it lives exclusively on *Populus nigra.*

Material examined: The material mentioned under measurements, in the collection of D. Hille Ris Lambers (except all types but one). Types in the Laboratorio di Entomologia Agraria, University of Milano, Italy, one paralectotype in the collection of D. Hille Ris Lambers, Bennekom.

Fundatrix: unknown.

Apterous viviparous female.

In life dorsally shiny black with the underside red-brown. In mounted specimens body broadly oval, about 1.60—2.85 mm long. Front sinuated; median frontal tubercle about as high as lateral frontal tubercles. Antennae about 0.6—0.8 times length of body; segment I and II of antennae dark, from the pale, or basally pale, segment III gradually darker towards the base of segment VI; processus terminalis gradually slightly paler towards apex; segment III with rather distinct imbrications especially at base, sometimes with a few rhinaria, also in later generations than the second, and with 16—29 hairs generally pointed, sometimes blunt or with thread-like apices; longest of these hairs, which are rather different in length, 0.031—0.042 mm long and 1.1—1.4 times basal diameter of the segment; processus terminalis 3.5—6 times as long as base of segment VI. Tip of rostrum just reaching hind coxae; last segment 0.143—0.185 mm long, 0.8—1.0 times as long as second joint of hind tarsi; this low proportion is especially caused by the long second joints of tarsi (see sub legs); number of accessory hairs on last segment of rostrum 7—11. Mesosternal processes rather low and extensive and in mounted specimens mostly somewhat confluent. Stigmal plates, at least the more posterior ones, generally united with the dark sclerotic dorsal shield, which is quite smooth without reticulations. Stigmal pori small, with a thick, rather heavy sclerotic rim; greatest inner diameter of the stigmal porus of abdominal segment I 0.023—0.036 mm. Spinal tubercles absent, marginal tubercles often present on segments II, III and IV, sometimes on I and metathorax, all rather or very small, and flat or semi-globular. Spinal hairs of tergite III rather variable in length, 0.042—0.063 mm long, 1.2—2.3 times as long as basal diameter of antennal segment III; these hairs in specimens in spring with blunt or knobbed apices, and in specimens in autumn mostly with thread-like apices. Abdominal tergite VIII with 6—12 hairs with thread-like apices, most of

these hairs placed in a row on the posterior margin of the sclerotic part of the segment; longest of these hairs 0.09—0.11 mm long, 2.7—4.2 times as long as basal diameter of antennal segment III. Siphunculi dark, truncated conical, sometimes slightly constricted at base where they are about twice as wide as in the very distinct annular incision below the flange, about 0.07 of length of body and 0.7—1.1 times length of second joint of hind tarsi, with rather straight imbrications, the basal 1/5—1/7 part more or less smooth; the wide flange about 1.4 times as wide as the siphuncular width in the subapical incision. Cauda rounded or semi-oval, about 1.5 times as wide at base as it is long, with some 10—15 hairs. Legs with the fore femora pale with dorsally dark apex, the middle femora pale smoky with dorsally dark apex, or blackish with pale base, mostly only a little more pale than hind femora, which are blackish with pale base; tibiae pale with dark base and apex; first tarsal joints with 3, 3, 3 hairs; second joints of hind tarsi 0.143—0.202 mm long and 5.2—7.2 times as long as the greatest inner diameter of the stigmal porus of abdominal segment I; the second joints of other tarsi a little shorter.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	1.60	1.17	0.30	0.16	0.14	0.08+0.37	—	0.08
2	—	1.51	0.39	0.22	0.16	0.09+0.49	0.15	—
3	1.66	1.19	0.30	0.16	0.14	0.08+0.38	0.12	—
4	2.78	1.80	0.49	0.30	0.22	0.09+0.52	0.14	0.11
5	2.48	1.95	0.49	0.33	0.24	0.11+0.61	0.16	—
6	2.13	1.37	0.41	0.23	0.18	0.09+0.31	—	0.10
7	2.21	1.54	0.40	0.26	0.19	0.09+0.44	0.14	0.10
8	2.72	2.06	0.52	0.40	0.26	0.11+0.59	0.19	0.12

(1, *Populus nigra,* (Spagna) Spain, date unknown, leg. Del Guercio (lectotype); 2 and 3, *Populus nigra,* (Spagna) Spain, date unknown, leg. Del Guercio (paralectotypes); 4, *Silene vulgaris,* Bosco-Lugano (Switzerland), 29.V.1950, leg. Stäger; 5, *Silene vulgaris,* Grossglockner, 2200 m (Austria), 28.VIII.1960, leg. D.H.R.L.; 6, *Silene vulgaris,* Trento (Italy), 12.VI.1965, leg. D.H.R.L.; 7, *Silene vulgaris,* Schynige Platte (Switzerland), 9.IX.1966, leg. D.H.R.L.; 8, *Silene vulgaris,* Cavtat (Yugoslavia), 19.IV.1966, leg. D.H.R.L.)

Alate viviparous female.

In mounted specimens head and thorax dark, abdomen on tergite III with a spino-pleural sclerotic bar, which only in the pleural zone is fused with a more or less united sclerotic spino-pleural blotch extending from abdominal tergites IV to VI; this blotch also fused with the marginal sclerites of segments V and VI; marginal sclerite of segment III with 9—14 hairs. Antennae dark, about as long as body; segment III along one side with 19—36 flat rhinaria of various sizes; segment IV mostly without rhinaria, sometimes with 1—3 along one side; processus terminalis longer than in apterae

viviparae. Wings with normal venation, the veins light brown, the subcosta pale, the stigma rather dark.

Other characters about as in apterae viviparae.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhinaria on III	IV	Siph.	Cau.
1	2.19	2.24	0.55	0.38	0.30	0.10+0.75	29 & —	0 &—	0.15	—
2	2.25	—	—	—	—	— —	28 & —	0 &—	0.15	0.10
3	2.11	2.30	0.55	0.39	0.30	0.13+0.77	27 & 31	0 & 0	0.18	0.12
4	2.58	2.50	0.58	0.47	0.33	0.14+0.79	25 & 28	0 & 0	0.22	0.14
5	2.40	—	—	—	—	— —	32 & 36	0 & 1	0.20	0.10
6	2.15	2.01	0.53	0.36	0.26	0.09+0.61	23 & 26	0 & 0	0.16	0.11

(1 and 2, *Silene vulgaris,* Trento (Italy), 12.VI.1965, leg. D.H.R.L.; 3 and 4, *Silene vulgaris,* Cavtat (Yugoslavia), 19.IV.1966, leg. D.H.R.L.; 5, *Silene vulgaris,* Cavtat (Yugoslavia), 20.IV.1966, leg. D.H.R.L.; 6, *Silene vulgaris,* Arogno (Switzerland), 21.VIII.1962, leg. Remaudière)

Oviparous female.

In mounted specimens body smaller than in apterae viviparae. Tergum wholly membranous and colourless to slightly sclerotic. Hind tibiae on basal half more or less incrassate and mainly there with 20—65 pseudosensoria, some of which extend more distad. Other characters about as in apterous viviparous female.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Siph.	Cau.
1	2.05	1.16	0.24	0.19	0.15	0.07+0.39	0.13	0.09
2	2.15	1.30	0.28	0.23	0.18	0.08+0.40	0.14	0.09
3	1.60	1.14	0.28	0.18	0.15	0.08+0.33	0.11	0.08
4	1.75	1.17	0.26	0.17	0.16	0.09+0.36	0.12	0.09

(1 and 2, *Silene vulgaris,* Grossglockner, 2200 m (Austria), 28.VIII.1960, leg. D.H.R.L.; 3 and 4, *Silene vulgaris,* Col de Puymorens, 1800 m (France), 18.IX.1952, leg. Remaudière).

Apterous male.

In mounted specimens body more slender than in alatae viviparae, and smaller. Head dark sclerotic, thorax and abdomen with smoky sclerotic spino-pleural transverse bars, which on metathorax and tergites I and II are small, irregular and sometimes locally united or missing, on tergites III—VII broader, more regular and more or less locally united, especially in the pleural zone, while on tergites V—VII they are united also

with the marginal sclerites. Antennae longer than body, dark like the head; rhinaria chiefly along one side; on segment III about 28—37 rhinaria, on segment IV about 16—30 rhinaria and on segment V about 11—17 secondary rhinaria. Siphunculi cylindrical or very slightly tapering. Genitalia normal. Other characters about as in alatae viviparae.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhin. on segments III	IV	V	Siph.	Cau.
1	1.68	1.86	0.44	0.35	0.26	0.09+0.57	30 & 36	28 & 22	16 & 16	0.10	0.07
2	1.71	1.83	0.41	0.37	0.27	0.09+0.54	35 & 35	23 & 17	12 & 13	0.11	0.06

(1 and 2, *Silene vulgaris*, Grossglockner, 2200 m (Austria), 28.VIII.1960, leg. D.H.R.L.)

Alate male.

In mounted specimen thorax more sclerotic than in apterous male. Segment III of antenna with more rhinaria than in apterous male. Genitalia normal. Wing venation normal. Other characters about as in apterous male.

Measurements in mm.

No.	Length body	Ant.	Ant. segments III	IV	V	VI	Rhin. on segments III	IV	V	Siph.	Cau.
1	1.58	1.98	0.53	0.36	0.23	0.11+0.60	37 & 40	15 & 16	11 & 13	0.10	0.08

(1, *Silene vulgaris*, Col de Puymorens, 1800 m (France), 18.IX.1952, leg. Remaudière)

Brachycaudus (Acaudus) persicae (Passerini, 1860)

Myzus persicae Passerini, 1860: 35.

Brachycaudus persicae (Pass.) has a complete or partial host alternation from *Prunus* (and *Amygdalus*) to *Euphrasia, Melampyrum, Rhinanthus* and, possibly, related Scrophulariaceae.

An indication for host alternation is given by the observation that in summer *Brachycaudus persicae* (Pass.) is rarely met with on *Prunus* and moreover that many alatae generally appear in spring. The suspicion of host alternation to Scrophulariaceae arose when Dr. D. Hille Ris Lambers noticed that in Australia *Brachycaudus persicae* (Pass.) not only was found on *Prunus* but also on *Parentucellia latifolia*. Also Eastop (1966) suspected the possibility of host alternation. *Brachycaudus mimeuri* Remaudière, only met with on *Euphrasia lutea*, does not show morphological differences from *Brachycaudus persicae* (Pass.) from *Prunus*, but is generally smaller.

In April 1969, I received living *Brachycaudus persicae* (Pass.) from a glass-house at

Blokker (Netherlands), where the animals were found on the above ground parts of plums. Almost immediately alatae appeared, which were transmitted to *Euphrasia* sp. and *Rhinanthus glaber,* and afterwards also from *Euphrasia* and *Rhinanthus glaber* to *Melampyrum pratense*. The animals bred in numerous colonies on these Scrophulariaceae till the end of July. The aphids lived on the above ground parts of the secondary host-plants. After July the plants died so that the culture could not be continued.

Brachycaudus persicae (Pass.), 12.V.1969, brought by D. Hille Ris Lambers from the above ground parts of apricot (*Prunus armeniaca*) from Ventimiglia (Italy), were first transmitted to peach (*Prunus persica*). As could be expected, alatae did not appear any more. On 10.IX.1969 a number of apterae viviparae were transferred from peach to *Melampyrum pratense*. Although in the beginning most of the produced larvae on *Melampyrum* died, the transfer succeeded eventually. The culture on the above ground parts of *Melampyrum pratense* could be continued till November 1969. During November a lot of alatae (gynoparae) appeared, the first on 5.XI.1969. A prolonged culture unfortunately failed because the foodplant succumbed.

Acknowledgements

I am very much indebted to Dr. D. Hille Ris Lambers, Bennekom, for the opportunity to examine the *Brachycaudus* material in his collection and for advice on the manuscript.

Thanks are also due to Drs. V F. Eastop (London, England), J Holman (Prague, Czechoslovakia), M. Martelli (Milano, Italy), J. M. Nieto Nafría (Salamanca, Spain), F. Ossiannilsson (Uppsala, Sweden), G. Petersen (Eberswalde, Germany), G. Remaudière (Paris, France), G. Kh. Shaposhnikov (Leningrad, Russia) and H. L. G. Stroyan (Harpenden, England), for the loan or gift of material.

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F. WILLEMSE. — Studies on the acridoid genera *Opiptacris* Walker and *Bumacris* Willemse (Orthoptera, Acridoidea), p. 117—158, Fig. 1—44, colourplates 1—4.

Tijdschrift voor Entomologie, deel 118, afl. 6 Gepubliceerd 30.XII.1975

STUDIES ON THE ACRIDOID GENERA OPIPTACRIS WALKER AND BUMACRIS WILLEMSE (ORTHOPTERA, ACRIDOIDEA)

by

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Abstract

The genus *Opiptàcris* is redefined. A striking contrast between a great variety of distinct colour-patterns and fewer, less conspicuous, morphological characters has been found. More than 20 taxa are recognized; if based on morphological characters these are given the rank of species, if based on colour the status of subspecies. *O. pictipennis* is removed from the genus, and its original combination, *Cranae pictipennis* C. Willemse, re-established; *O. salomona* Ramme is synonymized with *O. bougainvillea* Ramme; *O. atriceps* and *O. signata,* both C. Willemse, are synonymized with *O. ruficeps* C. Willemse; *O. georgica* C. Willemse is considered a subspecies of *O. uniformis* C. Willemse; *O. signata tulagii* Uvarov is given specific rank. The following species and subspecies are described as new: *O. tenuis, O. novageorgica, O. vellalavellae, O. choiseulensis, O. unicolor, O. alata,* and *O. ruficeps aberrans, O. uniformis cephalica, O. uniformis tricolor, O. uniformis bicolor, O. uniformis striata, O. bougainvillea femorata, O. bougainvillea fauroensis.*

The genus *Bumacris* is redescribed, and two subgenera are distinguished, viz., *Bumacris* and *Cristovalacris* subgen. nov. *Cristovalacris* occurs with one species, *venosa* spec. nov., on San Cristoval; nominate *Bumacris* is represented with six species and two subspecies on most other islands of the Solomon Islands. *B. georgica* C. Willemse is synonymized with *B. leveri* Uvarov. The following taxa are described as new: *B. rendovae* sp. n., *B. pagdeni mundae* ssp.n. and *B. pagdeni kolombangarae* ssp.n. Keys to the taxa within the genus are given.

Introduction and acknowledgements

Most species of the two genera treated in the present paper had been described after one or a few specimens, and were known from one sex only. A rich material, received from the Bernice P. Bishop Museum and the British Museum (Natural History), allowed for a revision of the two taxa.

In the course of this study types and other material have been borrowed from the following institutions (abbreviations as used in the text):

ANSP, Academy of Natural Sciences, Philadelphia
BMNH, British Museum (Natural History), London
BPBM, Bernice P. Bishop Museum, Honolulu
MNHN, Muséum National d'Histoire Naturelle, Paris
NMB, Naturhistorisches Museum, Basel
NMM, Natuurhistorisch Museum, Maastricht
NMW, Naturhistorisches Museum, Wien
RMNH, Rijksmuseum van Natuurlijke Historie, Leiden
ZMHU, Zoologisches Museum, Humboldt-Universität, Berlin (presently Museum für Naturkunde)

My thanks are due to the following persons for helping me with material: the late Miss S. Nakata and J. L. Gressitt, Honolulu; the Keeper of Entomology of the British

Museum (Natural History), D. Hollis and Miss J. Meadows, London; K. K. Günther, Berlin; M. Descamps, Paris; C. Baroni Urbani, Basel; M. Beier, Vienna; H. Radclyffe Roberts and D. Rentz, Philadelphia, and P. H. van Doesburg, Leiden.

My special thanks are due to V. M. Dirsh, who allowed me to study his material, now granted to the British Museum (Natural History) and to C. A. W. Jeekel for much helpful criticism.

All measurements in the text are given in millimetres.

Opiptacris Walker, 1870

Opiptacris Walker, 1870: 650; Kirby, 1910: 387; C. Bolívar, 1932: 394; Uvarov, 1937: 17; Ramme, 1941: 92; C. Willemse, 1956: 6, 90; Kevan, 1966: 407.
Salomonacris C. Willemse, 1931: 336; Uvarov, 1937: 17; C. Willemse, 1956: 91; Kevan, 1966: 407; F. Willemse, 1966a: 41.

Type species: *Opiptacris hilaris* Walker, 1870.

The genus *Opiptacris* was described by Walker, 1870, and based on a single species, *O. hilaris* Walker, 1870. Up to now, nine species and one subspecies have been distinguished. Material was always very scarce and the taxa were described after one or a few specimens. The number of localities represented in the new material from the Bernice P. Bishop Museum and the British Museum (Natural History) is considerable (54): two occur in the Bismarck Archipelago, the others are scattered all over the Solomon Islands. After the specimens were sorted according to locality, and these again arranged according to geographical position, the following results became evident.

There is a great variety of colour patterns, which are very constant and clearly distinct from each other. Transitions are not seen. Furthermore, each pattern is typical for a definite locality or a group of adjacent localities. In contrast to this diversity in colour, the morphology is comparatively uniform. On the basis of a few minor morphological differences, the material can be arranged into several groups. The area of such a group covers a definite, contiguous part of the range of the genus. The number of morphologically defined groups is much lower than that of distinct colour patterns. Sympatric occurrences of forms, distinct either morphologically or in coloration, are not seen in the available material, but the possibility cannot be excluded.

In *Opiptacris*, apterism and the occurrence on islands act as isolating mechanisms. The sexual dichromatism of some populations might indicate that colour is an additional isolating factor. However, any actual information on reproductive isolation is lacking. It will be understood that a taxonomic treatment of such a complex is subject to a considerable amount of uncertainty.

Although the results will not always be convincing, I have tried to classify the material by adopting two principles, viz., (1) assigning populations to the category of a species on the basis of morphological characters, and (2) within such a morphological concept assigning populations to the category of a subspecies on the basis of differences in colour pattern. As to (1), it should be pointed out that morphological distinction often is quite difficult. As to (2), the stable, well-defined and conspicuously developed diversity in coloration, is considered an indication of a fundamental, genetical basis. Therefore, the present study should be taken primarily as a formal recognition of taxa within the

Opiptacris-complex. The second step in classification, the categorial ranking of these taxa, cannot be carried out yet.

Redescription.

♂ ♀. Body of medium size, cylindrical. Integument shiny, almost smooth, pronotum slightly pitted, face wrinkled, the occiput, on each side, with a row of slight transverse impressions. Antennae filiform, segments up to five times as long as wide, the tip reaching about middle of hind femur. Head thick and round, as long as, or a little longer or shorter than the pronotum. Eyes ovoid-hemispherical, more or less prominent, interocular distance usually narrower than the greatest width of the fastigium verticis. Fastigium verticis at a lower level and marked off from the rest of the vertex; from above triangular, the rounded margins converging towards the parabolic or truncate apex, which does not exceed the antennal scape; in profile subhorizontal, more or less declivous anteriorly and meeting the frontal ridge about rectangularly. Frons slightly reclinate; frontal ridge present only above median ocellus, margins obtuse and nearly parallel. Lateral facial keels straight, low and divergent. Occiput and genae convex.

Pronotum cylindrical, without keels, in the middle not or slightly compressed laterally. From above, anterior margin slightly rounded, posterior margin truncate or, usually, slightly concave. Four deep transverse sulci; first (submarginal), third and fourth (typical) both on dorsum as well as on lateral lobes; the second one only on dorsum. The distance between the fourth and third sulci is the greatest, being about one-fourth of the pronotal length; distance between first sulcus and anterior margin the smallest, about one-sixth of the pronotal length; distances between first and second sulci, the second and third sulci, and the fourth sulcus and posterior margin of pronotum, approximately equal. Lateral lobe about as long as high, usually slightly longer; deepest point of lower margin at level of third sulcus, from here the lower margin is convex posteriorly, concave anteriorly; anterior edge obtuse-angulate, posterior edge rounded or slightly projecting posteriorly; anterior margin straight, posterior margin slightly concave, both margins divergent dorsally. Mesonotum about two-thirds the length of metanotum, more or less covered by the pronotum. Metanotum about as long as the distance between anterior margin and second sulcus of pronotum. Prosternal tubercle strong, vertical, transverse, apex widened laterally and truncate ventrally. Mesosternal lobes about as long as wide, inner margins convex, their interspace a little narrower than a lobe. Metasternal interspace about triangular.

Tegmina vestigial. Elytron reaching hind margin of metanotum or shorter, ranging from elongate-elliptical to almost circular, partly or completely sclerotized. Hind wing a narrow, membranous suture. Tympanum not distinct, indicated as a narrow, weak furrow. Legs short and robust. Hind femur as long as abdomen in male, slightly shorter in female, fish-bone pattern strong, keels obtuse, lower inner keel pilose, upper keel terminating into an obtuse point. Knee-lobes broadly rounded or slightly truncate. Brunner's organ present. Hind tibia shorter than hind femur, slightly widened distally, margins obtuse and pilose, spines strong, seven inner and five or six outer spines, the apical spines included. Hind tarsus pilose, about two-thirds of tibial length, first and second segments of equal length, third segment slightly longer than second segment. Claws and pulvillus strong.

♂. Hind margin of last abdominal tergite (Fig. 1) excised medially, with small,

triangular, pointed furculae laterally. Supra-anal plate (Fig. 1) slightly wider than long, roughly triangular, apex obtuse, lateral margin thickened, near base with slight, transverse impression or ridge. Cercus (Fig. 2) slender, slightly upcurved, its pointed apex reaching just beyond the tip of the supra-anal plate. Subgenital plate subconical, short, apex obtuse.

Phallic complex (Fig. 3—9). Epiphallus bridge-shaped; ancorae small and situated rather laterally; inner lophi small and tooth-shaped, outer lophi large and hook-shaped and slightly recurved. Ectophallic membrane with pair of dorsal, weak sclerites of irregular shape. Cingulum with horseshoe-shaped apodemal structure and lateral rami, extending ventro- and dorso-posteriorly. Between the cingular zygoma and the upper margin of the rami, a central ectophallic membrane, to which is attached the arch of cingulum. The cingular valves are upcurved, short, not extending into the phallotreme. Basal penis valve with narrow gonopore process and wide lateral expansion. Apical penis valve upcurved. Apex of phallus roughly conical, tip of apical penis valves slightly out- and recurved, connected laterally with the sheath of penis.

♀. Last abdominal tergite with hind margin widely and triangularly excised. Supra-anal plate twice as long as wide, tongue-like, apex narrowly parabolic. Cerci conical, short, not reaching tip of supra-anal plate, slightly outcurved. Subgenital plate (Fig. 10) twice as long as wide, hind margin widely rounded laterally, triangularly produced medially; ventral side on each side with a short, low, obtuse keel reaching hind margin. Ovipositor valves (Fig. 10—11) slender, straight, margins finely serrate, almost smooth. Lateral basivalvular sclerite elongate-triangular, ventral basivalvular sclerite three to four times as long as wide. Dorsal side of subgenital plate (Fig. 12) with pair of simple, round columellae. Spermatheca (Fig. 13) with an apical diverticulum and a wider, strongly curved, preapical diverticulum.

Coloration conspicuously different in the various taxa (Pl. 1—3 Fig. 1—32). Sexual dichromatism ranges from slight to strong. With few exceptions, no strong dichromatism between juvenile and adult stages is present. There are several kinds of what superficially may be called 'black'. Apart from jet-black, there is black with a distinct shade of blue, orange, red, or brown. Of practical use is the observation that 'black' with a shade of orange, red, or blue in adult specimens, corresponds to a distinct orange, red or blue pigmentation in juveniles.

To avoid lengthy descriptions, the following features, similar in all species and subspecies of the genus, are summarized here: eye colour varies individually from yellowish to dark brown; scape and pedicle of antenna are of the same colour as the face; mouthparts and face are coloured similarly or are partly black, but the upper lateral clypeal angle and apical part of the mandible are always dark brown or black; the crescents of the hind knee are dark castaneous brown; in the male the tip of the spines of the hind tibia, the claws and the furculae are black.

Distribution. The genus is distributed throughout the Papuan subregion, but mainly over the Solomon Islands.

Discussion.

As pointed out by Kevan (1966), the distinction of *Salomonacris* C. Willemse, 1931, cannot be accepted, as complete apterism does not occur. Its synonymy with *Opiptacris* is now established.

The genus *Opiptacris*, in the present concept, is a natural grouping of populations, closely related to *Cranae* Stål, 1878. Provisionally, these two genera are referred to the subfamily Catantopinae.

Among *Opiptacris*, nine species and one subspecies were distinguished. One of the species included is *O. pictipennis* (C. Willemse, 1932). Originally described under *Cranae*, it was transferred to *Opiptacris* by Uvarov (1937). An examination of the type series (RMNH & NMM) reveals that the relationship to *Cranae* is much closer than to *Opiptacris*. The strongly pitted integument, smaller eyes, less cylindrical pronotum, larger elytra and especially the male phallic complex agree with *Cranae* rather than with *Opiptacris*. Therefore, I propose to re-establish the original combination *Cranae pictipennis*.

In the present study, *O. atriceps* (C. Willemse, 1931) and *O. signata* (C. Willemse, 1935) are synonymized with *O. ruficeps* (C. Willemse, 1931); *O. salomona* Ramme, 1941, with *O. bougainvillea* Ramme, 1941; *O. georgica* C. Willemse, 1956, is considered a subspecies of *O. uniformis* C. Willemse, 1956, and *O. signata tulagii* Uvarov, 1937, is given full specific rank. Among the material on hand, 12 species, eight additional subspecies and one unnamed species are distinguished.

As to the morphology, the *Opiptacris*-complex is noted for a remarkable scarcity of taxonomically useful characters. The external and internal male and female genitalia appear rather uniform. Slight differences in the phallic complex between populations may be due to variation and are difficult to evaluate. A more reliable character is found in the elytra: their size, form, and degree of sclerotization. Other morphological characters of some taxonomic importance are the following: general appearance, form of head, prominence of the eyes, width of the interocular distance, shape of the fastigium verticis, form and length of the pronotum, and depth of the transverse sulci. It must be pointed out that the reliability of these features depends much upon the size of the sample of the population. Whenever possible, series of specimens should be compared. In view of the greatly similar morphology, lengthy descriptions of the morphological characters of the taxa are omitted.

As to the conspicuous differences in colour, reference is made to what has been said in the introduction.

In the absence of much basic information on the genus, little can be said on specific groupings. Only the following general observations can be made, using the elytra as a guide. Two groups occur on the periphery of the range of the genus. A northwestern group, represented by *alata* spec. nov. and *castanea* Kevan, from the Bismarck Archipelago, has the largest elytra. A southeastern group, *ruficeps ruficeps* C. Willemse and *ruficeps aberrans* subspec. nov., from Malaita I., has the smallest elytra. In the other species the size of the elytra is intermediate between these two peripheral groups. They are also geographically intermediate, occurring between the Bismarck Archipelago and Malaita I. (except *hilaris* Walker, described in 1870 after a single male from the New Hebrides, a record never since confirmed). Among the latter, intermediate, group a distinction can be made between the species occurring on the New Georgia Is. (*novageorgica* spec. nov. and *vellalavellae* spec. nov.) and those occurring on Guadalcanal I. in the south to Bougainville I. in the north. The former species have the elytra strongly sclerotized, and almost circular, while the elytra in the latter species are less sclerotized and elongate-elliptical. As to colour a grouping of the species appears of little use.

As stated above, morphological distinction of the taxa is quite difficult. Besides, some

species were described after discoloured material, others are known in one sex only (sexual dichromatism). Therefore, no key but a survey is given, listing the taxa known from the various parts of the range. Supplemented by the figures in colour, it will serve as a practical guide.

Survey of the distinguished taxa in *Opiptacris*

New Hebrides	*hilaris* Walker (after a single discoloured male, no precise locality)
Solomon Is.:	
Malaita I.	*ruficeps ruficeps* (C. Willemse)
	ruficeps aberrans subspec. nov.
Guadalcanal I.	*tenuis* spec. nov.
	spec. nov.? (only ♀)
Florida Is.	*tulagii* Uvarov (only ♀, Tulagi I.)
New Georgia Is.	*novageorgica* spec. nov. (New Georgia I., Sasavele I., Kolombangara I., Gizo I., Rendova I.)
	vellalavellae spec. nov. (Vella Lavella)
Santa Isabel I.	*uniformis uniformis* C. Willemse (based on a single discoloured male, no precise locality)
	uniformis georgica C. Willemse (only ♀, San Jorge I.)
	uniformis cephalica subspec. nov. (Tatamba, Raja)
	uniformis tricolor subspec. nov. (Rasa, Nagolau)
	uniformis bicolor subspec. nov. (Tolana, Buala)
Wagina I.	*uniformis striata* subspec. nov.
Choiseul I.	*choiseulensis* spec. nov.
Bougainville I.	*unicolor* spec. nov. (Togerao)
	bougainvillea bougainvillea Ramme (Buka I., NE Bougainville I.)
	bougainvillea femorata subspec. nov. (C. and S. Bougainville I.)
	bougainvillea fauroensis subspec. nov. (only ♂, Fauro I.)
Bismarck Archipelago:	
New Britain	*castanea* Kevan (only ♀)
Manus I.	*alata* spec. nov. (only ♂)
New Guinea:	
Jobi I.	spec.? (juvenile ♀, probably *Cranae* spec.)

Opiptacris hilaris Walker, 1870

(Pl. 1 Fig. 1)

Opiptacris hilaris Walker, 1870: 650; Kirby, 1910: 387; Uvarov, 1937: 17, 18; C. Willemse, 1956: 91, 92, 97; Dirsh, 1956: 277, Pl. 41 Fig. 23; Kevan, 1966: 410.

Material studied: ♂ holotype, labelled: New Hebrides 44 45, Opipt. hilaris W. Type, Type (BMNH). The specimen is strongly discoloured, lacks both antennae and the phallic complex, while both hind legs and the right fore leg have been repaired.

Redescription.

♂ (Pl. 1 Fig. 1). Slender. Head moderately globose. Face wrinkled. Fastigium verticis triangular, greatest width and length equal, in profile slightly declivous, the apex narrowly parabolic. Eyes moderately prominent. Interocular distance about half the greatest width of the fastigium verticis. Pronotum slightly shorter and wider than head, sulci strong. Elytron reaching middle of metanotum, elongate-elliptical, partly hyaline, apex narrowly parabolic.

Upper lateral clypeal angle, apical part of mandible, crescents of hind knee and base of hind tibia, dark brown. The furculae are black. Pronotum, first and second episterna, fore and middle coxae and femora, lower lobes of hind knee and abdomen possess a shade of violaceous and are darker than the straw-yellow head, hind femur and all tibiae. The hind knee has a faintly indicated, yellow, dorsal antegenicular spot.

♀. Unknown.

Measurements (♂) : l. of body 24.0; l. of pronotum 4.1; l. of elytron 1.2; w. of elytron 0.7; l. of hind femur 12.5.

Distribution. New Hebrides (no precise locality).

Discussion. Dirsh (1956) gave a figure of the epiphallus. As to the colour pattern, there is some resemblance to *uniformis tricolor* from Santa Isabel I. As no further material of the genus is known from the New Hebrides, the record certainly needs confirmation. The species (unfortunately the type-species) is poorly defined owing to the condition of the material.

Opiptacris ruficeps (C. Willemse, 1931)

The available material from Malaita I. is, morphologically, uniform. However, two quite different colour forms are present. One of these agrees fully with the holotype of *ruficeps*. The other, having never been recorded before, is named *ruficeps aberrans* ssp. n.

Opiptacris ruficeps ruficeps (C. Willemse, 1931)
(Pl. 1 Fig. 2—3)

Salomonacris ruficeps C. Willemse, 1931: 345, Fig. 2; F. Willemse, 1966a: 41.
Opiptacris ruficeps: Uvarov, 1937: 18; C. Willemse, 1956: 91, 92; Kevan, 1966: 410.
Salomonacris atriceps C. Willemse, 1931: 347, Fig. 3; F. Willemse, 1966a: 41. **Syn. nov.**
Opiptacris atriceps: Uvarov, 1937: 18; C. Willemse, 1956: 92, 93.
Cranae signata C. Willemse, 1935: 167, Fig. 1; F. Willemse, 1966a: 38. **Syn. nov.**
Opiptacris signata: Uvarov, 1937: 17, 18; C. Willemse, 1956: 92, 94; Kevan, 1966: 410.

Material studied: ♂ holotype of *Salomonacris ruficeps*, labelled: Inneres N. Malaita Salomonen IV.29. E. Paravicini, Salomonacris ruficeps n. sp. ♂ Det. C. Willemse, Type (NMB). Left antenna and right fore leg lacking.

♀ holotype of *Salomonacris atriceps*, labelled: Inneres N. Malaita Salomonen IV.29. E. Paravicini, Salomonacris atriceps n. sp. ♀ Det. C. Willemse, Type (NMB). Right antenna and left hind leg lacking.

♀ holotype of *Cranae signata*, labelled: Solomon Islands Malaita Is. Su'u Pandanus 16.VIII.1934 H. T. Pagden, 115, Cranae signata nov. sp. Dr. C. Willemse det. 1935, Type (BMNH). Both antennae and left fore leg lacking.

Additional material: Solomon Is., Malaita I.: Auki-Tangtalau, 25—200 m, 23.IX. 1957, J. L. Gressitt (1 ♂ 1 ♀); Tangtalau, 200 m, 23.IX.1957, B. Stone (2 ♂ 1 ♀); Tangtalau-Kwalo, 200—350 m, 24.IX.1957, J. L. Gressitt (1 ♀); Nana-Lava, 25 km NE Dala, 200 m, 16.VI.1964, J. Sedlacek (1 ♀); Dala, 50 m, 11.VI.1964, R. Straatman (1 ♂) & 9—14. & 22.VI.1964, J. M. Sedlacek (3 ♂ 3 ♀) (all BPBM); Nafinera, 27.IV.1955, E. S. Brown 3177 (1 ♂); Haffina, 27.V.1955, E. S. Brown 3177 (3 ♂ 1 ♀ 2 juv. ♀); Fulisago-Maelegwasu, 26.V.1955, E. S. Brown 3151 (1 ♂ 1 juv. ♂); Little Malaita, nr. Maramasike Passage, 27.XI.1965, low vegetation village garden, Roy. Soc. Exped. (1 ♀) (all BMNH).

Redescription.

♂ (Pl. 2 Fig. 2). Slender. Head moderately globose, eyes slightly prominent. Fastigium verticis as wide as long or, usually, slightly wider than long; in profile not or slightly declivous. Interocular distance slightly more than half the greatest width of the fastigium verticis. Pronotum short, as long and wide as head, lateral lobes parallel, sulci very strong. Elytron extremely small, not or very slightly extending beyond hind margin of mesonotum, elongate, apex narrowly parabolic.

Coloration red and black. Antennae bluish black, apically brownish black. Head from scarlet red to orange red, but face and fastigium verticis yellow or orange yellow. Thorax, elytron and first abdominal tergite as the head; pronotal sulci sometimes bluish; pleurae partly and meso- and metasterna laterally, dark blue; ventral side of prosternal tubercle yellow or blue. Abdomen (except the first tergite) from dark blue to bluish black; cerci and central area of subgenital plate sometimes yellowish. Coxae red or partly red and dark blue. Legs dark blue or bluish black; fore and middle knees and base of fore and middle tibiae often partly red; hind knee with a yellow or red, small, dorsal, antegenicular spot and a yellowish, very narrow, postgenicular ring.

♀ (Pl. 1 Fig. 3). Colour black and orange red to brown red. Antennae as in male. Vertex, occiput and genae black, sometimes with a shade of red. Fastigium verticis, face and mouthparts ranging from yellow, via orange and brown red to almost black. Thorax, elytron and first abdominal tergite as in male, but brown red and darker. Abdomen and legs as in male, but abdomen, fore and middle legs have a shade of dark brown rather than of dark blue.

Measurements: l. of body ♂ 22.0—23.0, ♀ 30.0—31.0; l. of pronotum ♂ 4.2—4.3, ♀ 5.5—5.7; l. of elytron ♂ 0.6—0.7, ♀ 0.6—0.9; w. of elytron ♂ 0.4—0.6, ♀ 0.4—0.5; l. of hind femur ♂ 11.8—13.0, ♀ 14.9—15.5.

Distribution. Solomon Is.: Malaita I.

Discussion. The species is characterized morphologically by its slender appearance, and especially by its very small elytra and deep pronotal sulci.

Comparison of the types of *Salomonacris atriceps* and *Cranae signata* with the material on hand, reveals their identity with the not earlier recognized female of *ruficeps*. Sexual dichromatism is evident. Juvenile specimens are coloured as the adult ones, the juvenile body is slightly paler red.

The male from Fulisago-Maelegwasu, some specimens from Haffina and the female from Little Malaita, differ slightly in colour from the holotype. The first recorded male has the fore and middle legs red, while the abdomen and hind femora are blackish red. Two males from Haffina have the typical colour, while the third male is coloured as

the Fulisago-Maelegwasu specimen. The female from Haffina is very dark, head and pronotum are black, while only the anterior and posterior margins of the pronotum and the elytra are red. The female from Little Malaita is completely black except for partly scarlet red face and pronotum, yellowish elytra and a small, red, antegenicular spot of the hind knee. The morphology agrees with *ruficeps*, but I am not quite certain as to the correctness of its present allocation.

Opiptacris ruficeps aberrans subspec. nov.
(Pl. 1 Fig. 4—5)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. Malaita Gisiuva, 26.I. 1965 P. J. M. Greenslade 16300 (BMNH); paratypes: Solomon Is., Malaita I.: Tanava, 22.I.1965, P. Greenslade 16204 (2 ♂) & 16203 (1 ♀) (BMNH); Kwailasi, 25.V. 1955, E. S. Brown 3128 (1 ♀) (BMNH); Fanabu, 3.IX.1954, E. S. Brown 916 (1 juv. ♀) (BMNH); Auki, 2—20 m, 2.X.1957, J. L. Gressitt (1 ♂) (BPBM); 6 km N. Auki, 60 m, 3.VII.1964, J. & M. Sedlacek (1 ♂) (BPBM).

Description.

♂ (Pl. 1 Fig. 4). Morphology as in the nominate subspecies.

Coloration black and yellow. Antennae and head as in nominate *ruficeps*, but rather more yellow or orange yellow than red. Thorax, abdomen and legs black with a shade of blue. Elytron yellow or orange yellow. Hind knee with ante- and postgenicular rings as in nominate *ruficeps*.

♀ (Pl. 1 Fig. 5). Completely black except for brown or yellow elytra, face mottled with dark brown, brownish eyes and sometimes an indistinct, yellow, antegenicular spot near the hind knee.

Measurements: l. of body ♂ 22.0—23.0, ♀ 30.0—32.0; l. of pronotum ♂ 4.2—4.4, ♀ 5.6—6.1; l. of elytron ♂ 0.6—0.7, ♀ 0.7—1.0; w. of elytron ♂ 0.3—0.5, ♀ 0.6—0.7; l. of hind femur ♂ 12.0—12.3, ♀ 14.1—14.9.

Distribution. Solomon Is.: Malaita I.

Discussion. Noticeable variation is unapparent. The distribution of this and the nominate subspecies cannot be indicated more precisely, because several localities could not be traced. Of special interest appears to be the region near Auki and Dala. Sexual dichromatism concerns the colour of the head. The juvenile female has the same colour as the adult one, but the "black" is dark blue instead.

Opiptacris tenuis spec. nov.
(Pl. 1 Fig. 6—7)

Material studied: ♂ holotype, labelled: Solomon Is. Guadalcanal I. Sutakiki R. 28.VI.1956 E. S. Brown B.M. 1957—201, 5351 (BMNH); ♀ allotype, labelled: Solomon Is. Guadalcanal I.: Gold Ridge 800 m VI-23-1956, J. L. Gressitt collector (BPBM); paratypes: Solomon Is., Guadalcanal I.: Gold Ridge, 500 m, 25.VI.1956, J. L. Gressitt (1 ♀) (BPBM); Gold Ridge, III.1955, E. S. Brown 2395 (1 ♀, 1 ♂ 1 juv. ♂ & ♀, latter three slightly discoloured) & 2465 (1 ♀) (all BMNH); Tenaru, 11.III.1955, E. S. Brown (1 ♂) (BMNH); Nalimbiu R., 20.I.1963, R. W. Paine 3492 (1 ♂)

(BMNH); Ngalimvatu, 8.VIII.1963, P. Greenslade 8455 (1 ♀) (BMNH); Honiara, 27.IV.1964, R. Straatman (1 slightly discoloured ♂) (BPBM).

Description.

♂ (Pl. 1 Fig. 6). Rather slender. Head moderately globose, eyes slightly prominent. Interocular distance about half as wide as the greatest width of the fastigium verticis, which is nearly as wide as long. Pronotum as long and as wide as the head, slightly compressed laterally, sulci moderately deep. Elytron elongate, apex parabolic, reaching middle of metanotum, hyaline along lower margin.

Coloration orange and black. Antennae brown. Head orange. Pronotum black with a distinct shade of orange. Rest of thorax, elytra and abdomen orange, except lower part of pleurae and lateral part of meso- and metasterna, which are orange black, as is the pronotum; cerci, furculae and lateral margins of supra-anal plate bluish black. Coxae orange black. Fore and middle femora bluish black. Fore and middle tibiae and tarsi orange black. Hind femur bluish black, the lower inner marginal area and a small, dorsal, antegenicular spot orange. Hind tibia and tarsus bluish black, proximal third part of hind tibia beyond condylus more orange.

♀ (Pl. 1 Fig. 7). Coloration black and yellowish brown. Antennae dark brown. Fastigium verticis, face and lower part of the gena yellow or brown, rest of vertex, occiput and area behind eye black. First episternum and pronotum brownish black; anterior and posterior angles of lateral lobe yellowish or brown. Pleurae with the upper part yellowish brown, the lower part brownish black. Sterna dark brown. Meso- and metanota, elytra and proximal abdominal tergites from above yellowish brown; rest of abdomen darker brown, sometimes with a shade of blue. Coxae, fore and middle femora and tibiae brownish black, tarsi paler. Hind femur bluish black, lower inner marginal area and a small, dorsal, antegenicular spot brown. Hind tibia and tarsus bluish black, hind tibia with a narrow postgenicular yellow ring.

Measurements: l. of body ♂ 21.5—22.5, ♀ 30.5—31.0; l. of pronotum ♂ 4.0—4.1, ♀ 5.4—5.6; l. of elytron ♂ 1.2—1.5, ♀ 1.5—1.6; w. of elytron ♂ 0.7—0.8, ♀ 0.9—1.0; l. of hind femur ♂ 11.7—12.1, ♀ 14.2—15.8.

Distribution. Solomon Is.: Guadalcanal I.

Discussion. The species is characterized by its slender general appearance. Variation in colour of the material from different localities (if not discoloured) is not noticeable. Form and size of the elytra are much as in the species occurring on Tulagi, Santa Isabel, Wagina, Fauro, Bougainville and Buka Is. Sexual dichromatism is apparent.

Optiptacris spec. nov.?

Material studied: Solomon Is., Guadalcanal, Lunga R., bridge, 3.IX.1960, C. W. O'Brien (2 ♀) (BPBM).

These two females are quite different from *tenuis*. The general appearance is more robust, the head more globose, the face less reclinate, the pronotum longer and the sulci deeper, while they differ mainly in colour by the presence of a wide, scarlet red band on each side over the pronotal dorsum. There is some resemblance with *tulagii*.

Opiptacris tulagii Uvarov, 1937
(Pl. 1 Fig. 8)

Opiptacris signata tulagii Uvarov, 1937: 18; C. Willemse, 1956: 95.

Material studied: ♀ holotype, labelled: Solomon Is. Tulagi 26.I.1935 H. T. Pagden, Pandanus, 3562, Opiptacris signata tulagii sbsp. n. Type Det. B. Uvarov 1936, Type (BMNH).

Redescription.

♂. Unknown.

♀ (Pl. 1 Fig. 8). Body moderately robust. Head strongly globose, face slightly reclinate. Fastigium verticis short, the length being slightly less than the greatest width, and distinctly marked off from the rest of the vertex. Interocular distance more than half the greatest width of the fastigium verticis. Pronotum in the middle slightly laterally compressed, sulci moderately deep. Elytron elongate, apex parabolic and reaching middle of metanotum.

Coloration black and scarlet red. Antennae bluish black. Face red and yellow, vertex and genae scarlet red except a mid-dorsal triangular black spot on the occiput. Thorax black, except the yellow anterior and red posterior angles of the pronotal lateral lobe, and three red spots on each side of the pronotal dorsum. Elytra scarlet red. Abdomen and legs bluish black, the hind knee with a red antegenicular and a yellow, narrow, incomplete postgenicular ring.

Measurements (♀): l. of body 33.0; l. of pronotum 6.2; l. of elytron 1.5; w. of elytron 1.0; l. of hind femur 15.6.

Distribution. Solomon Is.: Florida Is.: Tulagi I.

Discussion. This taxon was originally described as a subspecies of *signata* (now synonymized with nominate *ruficeps*). As the morphology of the head and the elytra in *tulagii* disagrees with *signata,* I propose to give *tulagii* full specific status. The species is characterized by its globose head. The head, the fastigium verticis and the elytra are useful to distinguish *tulagii* from the nearly similarly coloured female of *choiseulensis.*

Opiptacris novageorgica spec. nov.
(Fig. 1—2, 10—13, Pl. 1 Fig. 9—10)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is.: New Georgia Group N. Georgia I., Munda 1—30 m, VII-20-1959, J. L. Gressitt collector (BPBM); paratypes: Solomon Is., New Georgia Group, New Georgia I.: Munda, 1—30 m, 6. (1 ♂) & 14—15. (1 juv. ♂) & 15. (1 ♂ 1 juv. ♂ 1 ♀ 1 juv. ♀) & 20. (1 ♂ 1 ♀) VII. 1959, J. L. Gressitt (BPBM); Munda, 2.IX.1964, M. McQuillan 12797 (1 ♂ 2 ♀) (BMNH); Barike R., 19.VIII.1963, M. McQuillan 7660 & 7658 (4 ♂ 1 ♀ 1 juv. ♀) (BMNH).

Description.

♂ (Pl. 1 Fig. 9). Body short and wide. Head rather globose, face moderately wrinkled. Eyes comparatively large and prominent. Interocular distance about half the greatest width of the fastigium verticis, which is about as long as wide and, in profile, de-

clivous. Pronotum as long and wide as the head or shorter, sulci moderately deep. Elytron strongly sclerotized, scale-like, wide, the width more than half the length, apex widely parabolic; upper and lower margins strongly curved, whole elytron roughly circular and reaching the middle or almost the hind margin of metanotum.

Coloration yellowish brown and sanguineous red. Antenna dark blue. Head, thorax, fore and middle coxae yellowish brown. Elytron yellow or orange yellow. Abdomen black with a shade of blue, hind margins of tergites brown. Fore and middle legs yellowish red. Hind femur sanguineous red, hind knee dark blue. Hind tibia bluish black from above, orange black from below. Hind tarsus bluish black.

♀ (Pl. 1 Fig. 10). Coloration bluish black. Face below eye, lower cheek and mouthparts sometimes partly red. Elytron bright orange. Hind knee with an orange red, narrow, antegenicular ring.

Measurements: l. of body ♂ 22.0—23.5, ♀ 29.0—30.6; l. of pronotum ♂ 4.0—4.1, ♀ 5.3—5.7; l. of elytron ♂ 1.3—1.6, ♀ 1.4—2.0; w. of elytron ♂ 1.0—1.2, ♀ 1.2—1.4; l. of hind femur ♂ 11.3—11.8, ♀ 14.7—15.2.

Distribution. Solomon Is.: New Georgia Group; New Georgia I.

Discussion. The species is well-defined by the elytra. Sexual dichromatism is manifest. The colour of juvenile and adult specimens is almost alike, the former being only slightly paler.

Additional material: Solomon Is., New Georgia I.: 3 mls. W. of Lamberte-Munda, 3.IX.1965, Roy. Soc. Exped. (1 ♀); 2 mls. W. of Lamberte, 1.IX.1965, feeding on Pandanus, by coast road, Roy. Soc. Exped. (1 discoloured ♂); Wanawana, 16.VIII.1963, M. McQuillan 7678 (1 discoloured ♂) (all BMNH).

Solomon Is., New Georgia I.: Sasavele, 16.X.1954, E. S. Brown 1382 (1 ♂) (BMNH).

Solomon Is., Kolombangara I.: 1—12 m, 9.VII.1959, J. L. Gressitt (2 ♀) (BPBM); Kukundu, SW coast, 1—12 m, 10.VII.1959, J. L. Gressitt (2 ♂) (BPBM); Iriri, 5 & 100 & 100—250 m, 30.VI. & 1. & 2. & 3.VII. 1964, J. & M. Sedlacek (5 ♂) (BPBM); Pepele, 30 m, 31.I. & 7. & 10.II.1964, P. Shanahan (3 ♂ 1 ♀ 2 juv. ♀) (BPBM & BMNH); Sandfly Harbor, 5—200 m, 8.VII.1964, J. & M. Sedlacek (1 ♂) (BPBM); Gollifer's Camp, 100 m, 22.I.1964, P. Shanahan (1 ♀) (BPBM); Base Camp, 1 ml. inland from Kuzi, Kolombara R., 5.IX.1965, Roy. Soc. Exped. (1 ♂) (BMNH); Camp 1, 1 ml. inland from Kuzi, Kolombara River, 7. & 8.IX.1965, Roy. Soc. Exped. (1 ♂ 1 ♀) (BMNH); Mt. slope from 10 km, 300 m, 9.VII.1959, J. L. Gressit (1 juv. ♂) (BPBM); Kuzi, IX.1965, Roy. Soc. Exped. (2 discoloured ♂ 1 ♀) (BMNH); 2600′ Camp Gifa, 28.VIII.1965, Roy. Soc. Exped. (1 discoloured ♀) (BMNH); 1000′ foliage, 3.IX.1965, Roy. Soc. Exped. (2 discoloured ♀) (BMNH); forest nr.? 1.1965, Roy. Soc. Exped. (1 discoloured ♀) (BMNH).

Solomon Is., Gizo I.: 90 m, 27.VI.1964, J. & M. Sedlacek (1 ♀) (BPBM); 50—120 m, 16—26.IV.1964, malaise trap, J. Sedlacek (1 ♀ 2 juv. ♀ & 1 ♂, latter three discoloured) (BPBM); 21.VIII.1963, M. McQuillan 7517 & 7518 (1 discoloured ♂ 1 juv. ♂ & ♀) (BMNH); 20.IX.1965, P. Greenslade 20664 (1 discoloured ♀) (BMNH).

Solomon Is., Rendova I.: 17.VIII.1963, M. McQuillan 7543 & 7545 (3 ♂ & 1 ♀, all discoloured) (BMNH); Egolo, 1—10 m, 16.VII.1959, J. L. Gressitt (1 ♀) (BPBM).

This additional material agrees morphologically more or less with the type-series of *novageorgica*, while the differences in colour range from slight to considerable. I cannot

decide whether the populations should be considered different taxa. The colour of the available populations, (provided that they are not discoloured) may be briefly summarized, being compared with typical *novageorgica*:

New Georgia I., Lamberte-Munda and Lamberte: ♀, differs by small red areas on each side of the pronotal dorsum;

New Georgia I., Sasavele I.: ♂, differs by red antennae, fore and middle legs, hind tibia and abdomen;

Kolombangara I.: ♂, differs by yellowish brown fore and middle legs and reddish abdomen; ♀, similar to typical one;

Gizo I.: differs by brownish black general colour and orange brown face, part of genae, pronotal margins, elytra and antegenicular ring of hind femur;

Rendova I.: ♀, differs by brownish black general colour, yellowish brown mottled head and pronotum, brown elytra and brown antegenicular spot on the hind knee; elytra less scale-like and less circular than in typical *novageorgica.*

Opiptacris vellalavellae spec. nov.

(Pl. 1 Fig. 11—12)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is.: Vella Lavella I., Gingolo 60 m, 17.XI.1963, Gressitt B.M. 1971—197 (BMNH); paratypes: Solomon Is., Vella Lavella I.: Gingolo, 60 m, 17.XI.1963, Gressitt (1 ♂ 1 ♀) (BMNH); Ulo Crater, 10 m, XII. (1 juv. ♀) & 13. (1 ♀) & 16 (1 ♀) 500 (?800) m & 17. (1 ♂ 1 juv. ♀) XII.1963, P. Shanahan (BMNH & BPBM); Pussisoma, 20. (1 juv. ♀) & 21. (1 ♀) & 29. (1 ♂) XI.1963, P. Shanahan (BMNH); Head Water of Barakoma Creek, 29.XI. 1963, P. Shanahan (1 juv. ♂) (BMNH).

Description.

♂ (Pl. 1 Fig. 11). Moderately robust. Head rather globose, face very slightly wrinkled eyes slightly prominent. Fastigium verticis short and wide; in profile distinctly declivous. Interocular distance much wider than half the greatest width of the fastigium verticis. Pronotum about as long and as wide as the head, sulci moderately deep. Elytron much as in *novageorgica,* slightly more elongate, reaching middle of metanotum or just beyond this point.

Coloration yellowish brown and violaceous black. Head yellowish brown, mouthparts violaceous. Antennae as the head or slightly darker. Thorax violaceous black, with several yellow spots between the first and fourth sulci, both on pronotal lateral lobe as well as on either side of pronotal dorsum. Elytron yellow. Abdomen brown, proximal tergites violaceous from above. Fore and middle legs yellowish brown. Hind femur in proximal half violaceous black, in distal half yellowish brown. Hind knee and very base of hind tibia blackish brown. Hind tibia in proximal half olivaceous or yellowish green, in distal half violaceous. Hind tarsus as on proximal half of hind tibia.

♀ (Pl. 1 Fig. 12). Coloration yellowish brown and black. Antenna dark violaceous, paler apically. Head orange or brownish red. Thorax as in male; meso- and metanota sometimes not violaceous black but paler violaceous or brown, as the abdomen. Abdomen mottled with dark and pale brown with a shade of violaceous. Elytron and legs as in male, the violaceous colour of the hind leg usually being very dark.

Measurements: l. of body ♂ 22.1—23.0, ♀ 29.2—30.0; l. of pronotum ♂ 4.1—4.4, ♀ 5.3—5.5; l. of elytron ♂ 1.2—1.6, ♀ 1.4—1.9; w. of elytron ♂ 0.8—0.9, ♀ 0.9—1.0; l. of hind femur ♂ 11.8—12.2, ♀ 14.2—14.7.

Distribution. Solomon Is.: Vella Lavella I.

Discussion. The species is much alike *novageorgica.* It differs from the latter by the less wrinkled face, more slender general appearance and slightly elongate rather than circular elytra. Sexual dichromatism not conspicuous, restricted to the head only. The colour of juvenile specimens is nearly identical to that of the adult and quite unique within the genus.

Opiptacris uniformis C. Willemse, 1956

This taxon was described after a single male from Santa Isabel I. The material from this area (including San Jorge I. and Wagina I.) is morphologically similar. It agrees with the holotype of *uniformis* and represents a taxonomic unit, preliminarily given specific rank. Among the material on hand, five quite differently coloured forms are recognized. Each of these forms occurs on a confined area and is classified as a subspecies. Unfortunately, the holotype of *uniformis* is much discoloured and also lacks a precise locality. This being so, it will be understood that it is impossible to be certain whether or not any of the now recognized colour forms is identical with the nominate one.

Opiptacris uniformis uniformis C. Willemse, 1956

Opiptacris uniformis C. Willemse, 1956: 92, 96; F. Willemse, 1966a: 39; Kevan, 1966: 410 (?).

Material studied: ♂ holotype, labelled: Mus. Caes. Vind. Ins. Isabel (Salomo-Ins.) Albatros, Opiptacris uniformis n. sp. Det. C. Willemse, Type (NMW). The specimen besides being discoloured lacks both antennae, and the left middle and hind legs.

Redescription.

♂. Body robust. Head moderately globose, eyes slightly prominent. Interocular distance equal to about half the greatest width of the fastigium verticis, which is short, slightly wider than long, and, in profile, declivous. Pronotum about as long as head, sides slightly compressed in the middle, sulci deep. Elytron elongate, half as wide as long, apex narrowly parabolic, reaching beyond hind margin of mesonotum, but not beyond middle of metanotum.

As to the straw-yellow colour, the head is palest, the thorax darkest and the other parts intermediate.

♀. Unknown.

Measurements (♂): l. of body 24.7; l. of pronotum 4.0; l. of elytron 1.1; w. of elytron 0.6; l. of hind femur 12.9.

Distribution. Solomon Is.: Santa Isabel I.

Discussion. This taxon is poorly defined, see above. As for the record by Kevan, see below under *uniformis cephalica.*

Opiptacris uniformis georgica C. Willemse, 1956
(Pl. 2 Fig. 13)

Opiptacris georgica C. Willemse, 1956: 92, 96; F. Willemse, 1966a: 39.

Material studied: ♀ holo-, 2 ♀ paratypes, labelled: St. Georg Ins. Salomo. Ins. Albatros 15/2 1897, Opiptacris georgica sp. n. Det. C. Willemse, Type & Paratype (NMW). The holotype lacks both antennae and the left fore leg. All type-specimens are discoloured.

Additional material: Solomon Is., San Jorge, 23—27.IX.1965, scrub covered laterite hillside (coastal) and fringe of Casuarina forest, Roy. Soc. Exped. (1 ♀) (BMNH).

Redescription.

♂. Unknown.

♀ (Pl. 2 Fig. 13). Morphology as in nominate *uniformis*.

Colour black. Antennae dark brown. Head, first episternum and pronotum black; anterior angle of pronotal lateral lobe dark red. Pleurae, meso- and metasterna, meso- and metanota and abdomen bluish black. Elytron orange. Coxae, fore and middle femora bluish black. Fore and middle tibiae and tarsi orange brown. Hind leg bluish black, hind knee with a small, orange, antegenicular spot.

Measurements (♀): l. of body 30.8—31.9; l. of pronotum 5.9—6.0; l. of elytron 1.7—1.8; w. of elytron 0.9—1.0; l. of hind femur 15.5—16.0.

Distribution. Solomon Is.: San Jorge I.

Discussion. Because the morphology of *georgica* and *uniformis* is very similar, I propose the combination *uniformis georgica.*

The type specimens are discoloured, straw-yellow, except the blackish head and pronotum. The description given above is made after the well-preserved female collected in 1965. This agrees with the type specimens, morphologically as well as in the colour pattern. As to the latter, compare the remarks given above under the description of the genus.

Opiptacris uniformis cephalica subspec. nov.
(Fig. 3—9, Pl. 2 Fig. 14—15)

Opiptacris uniformis: Kevan, 1966: 410. (?)
Opiptacris sp. aff. *hilaris*: Kevan, 1966: 410. (?)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. Isabel Tatamba 25.4. 1963 M. McQuillan 5552 (BMNH); paratypes: Solomon Is., Santa Isabel I.: Tatamba [partim Tataba, misspelled?], 24.II. (3786 & 3787) & 25.IV. (5552 & 5553 & 5554 & 5556) & 24.V. (5568) & 25.V. (5567) & 27.V. (5605) & 22.VII. (7112) & 27.VIII. (7708) 1963 & 7.II. (10582) & 20.II. (10099 & 10100) 1964, M. McQuillan (15 ♂ 8 juv. ♂ 15 ♀ 9 juv. ♀) (BMNH); Tatamba, 2.X. forest and vegetation behind resthouse (1 ♂ 1 juv. ♀) 30.IX. low vegetation village garden (2 ♀) & 6.X. (1 discoloured ♀) & 29.IX. wooded hillside behind resthouse (2 ♂ 1 juv. ♂ 1 ♀ 1 juv. ♀, all discoloured) 1965, Roy. Soc. Exped. (BMNH); SE Tatamba, 0—50 m, 30.VIII.1964, sweeping, R. Straatman (1 juv. ♀) (BPBM); 2 mls. E. of Raja, Raja R., low vegetation village garden, 3.X.1965, Roy. Soc. Exped. (1 ♀) (BMNH).

Description.

♂ (Pl. 2 Fig. 14). Morphology as in nominate *uniformis*.

Colour black and yellow, orange or scarlet red. Antennae bluish black. Head, elytron, fore and middle tibiae and tarsi and a small, antegenicular spot on the hind femur yellow, orange red or scarlet red. Thorax, abdomen and remainder of legs bluish black; ventral side of hind tibiae with a shade of yellow.

♀ (Pl. 2 Fig. 15). Similar to male. Occiput sometimes with one or more narrow blackish lines.

Measurements: l. of body ♂ 22.8—24.0, ♀ 29.5—31.1; l. of pronotum ♂ 4.0—4.2, ♀ 5.4—5.6; l. of elytron ♂ 1.2—1.3, ♀ 1.4—1.9; w. of elytron ♂ 0.7—0.8, ♀ 0.7—0.8; l. of hind femur ♂ 11.8—13.1, ♀ 14.3—15.2.

Distribution. Solomon Is.: Santa Isabel I.

Discussion. Sexual dichromatism is not apparent. Juvenile specimens resemble the adult insect in colour, except for the bluish black, which is paler in the juvenile. Males of *uniformis cephalica, choiseulensis* and *ruficeps aberrans* are similarly coloured but otherwise not identical. In *choiseulensis*, the larger elytra and the different fastigium verticis, and in *ruficeps aberrans*, the much shorter elytra and the stronger pronotal sulci, are features distinguishing these from *uniformis cephalica*.

A male and female, both labelled "Fulakora Solomon Isl. W. M. Mann", have been referred by Kevan (1966) to *O. uniformis* and *O.* sp. aff. *hilaris*, respectively. Both specimens are before me. They are strongly discoloured. The morphology agrees with that of *uniformis*. Although both specimens agree with discoloured specimens from Tatamba and their localities are near, identification remains uncertain.

Opiptacris uniformis tricolor subspec. nov.

(Pl. 2 Fig. 16—17)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. Isabel Rasa 30.4.1963 M. McQuillan 5551 (BMNH); paratypes: Solomon Is., Santa Isabel I.: Rasa, 21.II. (3767) & 20.III. (3868 & 3869) & 30.IV. (5540 & 5551) & 23.VII. (7024 & 7084 & 7085 & 7081 & 7088) 1963 & 9.III.1964 (10694 & 10692), M. McQuillan (7 ♂ 1 juv. ♂ 18 ♀ 6 juv. ♀); Nagolau, 28.V.1963, M. McQuillan 5624 (1 juv. ♀) (all BMNH).

Description.

♂ (Pl. 2 Fig. 16). Morphology as in nominate *uniformis*.

Coloration orange, sanguineous red, and black. Antenna dark brown, often orange proximally. Head orange. First and second episterna and pronotum bluish black; the very anterior angle of the pronotal lateral lobe orange or red. Meso- and metathorax, elytron and abdomen orange or orange red; anterior and lateral margins of mesosternum bluish black; distal sternites, distal tergites laterally, and tip of abdomen, except the cercus, partly blue. Fore and middle coxae and femora bluish black. Fore and middle tibiae and tarsi orange. Hind coxa orange. Hind femur sanguineous red, with a yellowish antegenicular dot above. Hind knee bluish black. Hind tibia orange, the base, apex, and ventral side distally blackish. Hind tarsus orange.

♀ (Pl. 2 Fig. 17). Colour yellowish brown and black and sometimes sanguineous

red. Head completely yellowish brown or, usually, with occiput and area behind eye brownish black, with or without a yellowish brown stripe, on each side, over the occiput. Thorax bluish black; anterior and sometimes also posterior angles of pronotal lateral lobe, upper part of pleurae, and meso- and metanota, yellowish or orange brown. Elytron yellow or orange brown. Abdomen bluish black; proximal tergites yellowish or orange brown. Fore and middle legs and hind coxae as in male. Hind femur ranging from reddish black to completely sanguineous red in other specimens; antegenicular spot yellow. Hind knee, tibia and tarsus as in male, hind tibia usually more bluish black.

Measurements: l. of body ♂ 22.0—24.2, ♀ 30.2—33.0; l. of pronotum ♂ 4.2—4.4, ♀ 5.8—6.0; l. of elytron ♂ 1.2—1.3, ♀ 1.4—1.7; w. of elytron ♂ 0.6—0.7, ♀ 0.8—0.9; l. of hind femur ♂ 11.9—12.5, ♀ 15.2—16.1.

Distribution. Solomon Is.: Santa Isabel I.

Discussion. Sexual dichromatism moderately developed. Colour of juvenile specimens similar to, or paler than, that of adult specimens. Hind femur of juvenile female always red.

Opiptacris uniformis bicolor subspec. nov.

(Pl. 2 Fig. 18—19)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. Isabel Tolana 4.II.1964 M. McQuillan 10556 (BMNH); paratypes: Solomon Is., Santa Isabel I.: Tolana, 4. & 5. &.6.II.1964, M. McQuillan (10553 & 10554 & 10555 & 10556 & 10558 & 10559 & 10560 & 10589 & 10783) (5 ♂ 3 ♀ 1 juv. ♀); Buala, 25.II.1963, M. McQuillan 3795 (1 ♂ 1 ♀) (all BMNH).

Description.

♂ (Pl. 2 Fig. 18). Morphology as in nominate *uniformis*.

Coloration yellow or orange yellow and black. Antennae dark brown. Head yellow, orange yellow or orange red. First episternum and pronotum bluish black; pronotal dorsum on each side with an incomplete, faint, yellow or orange stripe running from anterior margin to fourth sulcus; anterior and sometimes also posterior angles of pronotal lateral lobe yellow or orange red. Meso- and metasterna laterally bluish black, medially yellowish. Upper part of pleurae yellow or orange red, lower part bluish black. Meso- and metanota and elytron yellow or orange red. Abdomen yellowish, the tip, sternites and tergites laterally, partly bluish black. Coxae, femora and hind tibia bluish black. Fore and middle tibiae yellow or orange red. Tarsi brown or bluish brown. Hind knee bluish black, ante- and postgenicular rings orange or orange red.

♀ (Pl. 2 Fig. 19). Colour as in male, except black band on head, usually, on each side, behind the eye and a median one over the occiput. Yellow stripes over the pronotum wider and more distinct than in male.

Measurements: l. of body ♂ 23.1—24.9, ♀ 32.5—34.1; l. of pronotum ♂ 4.4—4.6, ♀ 5.7—6.3; l. of elytron ♂ 1.2—1.3, ♀ 1.5—1.8; w. of elytron ♂ 0.7—0.8, ♀ 0.9—1.0; l. of hind femur ♂ 12.0—12.2, ♀ 14.5—15.8.

Distribution. Solomon Is.: Santa Isabel I.

Discussion. Sexual dichromatism is unapparent.

Opiptacris uniformis striata subspec. nov.

(Pl. 2 Fig. 20—21)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. Choiseul Wagina 26.8. 1964 M. McQuillan 12831 (BMNH); paratypes: similar label (12830 & 12831) (4 ♂ 1 juv. ♂ 2 ♀ 4 juv. ♀) (BMNH).

Description.

♂ (Pl. 2 Fig. 20). Morphology as in nominate *uniformis*.

Coloration orange red and black. Antennae brownish black. Head orange red, but posterior part of vertex, occiput and area behind eye black. Thorax orange red. Abdomen orange yellow, tip and distal tergites laterally with a shade of blue. Elytron and coxae orange yellow. Fore and middle femora and tibiae blue or bluish black, the tarsi dark brown. Hind femur yellowish with the carinae, carinulae and fish-bone pattern of inner and outer sides blue or bluish black. Hind knee bluish black, ante- and postgenicular rings yellow. Hind tibia bluish black, hind tarsus paler.

♀ (Pl. 2 Fig. 21). Colour black. Antennae as in male. Head brownish black with the face and lower part of gena yellow and mottled with black. Thorax brownish black; lower margin of pronotal lateral lobe narrowly bordered with yellow; meso- and metanota brown. Elytron yellowish brown. Abdomen brownish black, hind margin of tergites paler brown. Legs as in male, outer and upper sides of hind femur usually darker yellow ranging to dark bluish.

Measurements: l. of body ♂ 21.1—22.7, ♀ 29.2—31.1; l. of pronotum ♂ 4.2—4.3, ♀ 5.5—5.7; l. of elytron ♂ 1.0—1.3, ♀ 1.5—1.7; w. of elytron ♂ 0.5—0.6, ♀ 0.8—0.9; l. of hind femur ♂ 11.9—12.7, ♀ 15.1—15.8.

Distribution. Solomon Is.: Wagina I (= Vaghena I.).

Discussion. The striated pattern of the hind femur is quite characteristic. Juvenile specimens are slightly paler than adult ones. Sexual dichromatism is distinct.

Opiptacris choiseulensis spec. nov.

(Pl. 2 Fig. 22—23)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is., Choiseul I., Kitipi R. 80 m 17.III.1964, P. Shanahan collector Bishop (BPBM); paratypes: similar label (5 ♂ 1 juv. ♂ 4 ♀) (BPBM); Solomon Is., Choiseul I.: Kolombangara R., 60 m, 20.III.1964, P.S. (4 ♂ 3 ♀) (BPBM); Malangano, 25.VIII.1963, M. McQuillan 7326 (2 ♂) (BMNH).

Description.

♂ (Pl. 2 Fig. 22). Moderately robust. Head globose. Interocular distance narrow, half as long as the greatest width of the fastigium verticis. Fastigium verticis narrowly triangular, slightly longer than wide, and, in profile, not or very slightly declivous. Pronotum about equal in length and width to the head, sulci moderately deep. Elytron comparatively long, reaching almost as far as hind margin of metanotum or slightly shorter, about half as wide as long, elliptical, with apex parabolic.

Colour black and red. Antennae brown. Head scarlet, orange red or yellowish red.

Thorax, abdomen and legs bluish black. Elytron from orange red to yellow. Hind femur sometimes with a narrow, dorsal, yellow or red, antegenicular spot.

♀ (Pl. 2 Fig. 23). Colour similar to male, except the pronotum, which is black, but for the anterior and posterior angles of the lateral lobe and (on each side of the dorsum) an incomplete band, which are scarlet red or sometimes yellow.

Measurements: l. of body ♂ 23.5—24.9, ♀ 31.8—33.2; l. of pronotum ♂ 4.2—4.5, ♀ 5.9—6.0; l. of elytron ♂ 1.5—1.7, ♀ 2.0—2.5; w. of elytron ♂ 0.9—1.0, ♀ 1.1—1.2; l. of hind femur ♂ 13.0—13.8, ♀ 16.2—16.8.

Distribution. Solomon Is.: Choiseul I.

Discussion. The fastigium verticis and the form and length of the elytra are characteristic. Sexual dichromatism is moderately developed. The juvenile male from Kitipi R., is coloured similarly to the adult.

This species differs from *tulagii* (only ♀ known) by more globose head, shorter and more declivous fastigium verticis and shorter elytra in the latter. Distinction between *choiseulensis* and *ruficeps aberrans* is apparent. Both sexes differ by the shorter elytra, deeper pronotal sulci and shorter fastigium verticis, the female of the latter also by the black head. Distinction between *choiseulensis* and *uniformis bicolor* is indicated in both sexes by the shorter and more declivous fastigium verticis, the deeper pronotal sulci, the slight lateral compression of the pronotum and shorter elytra, the female of the latter moreover by the less completely black coloured abdomen.

Opiptacris unicolor spec. nov.

(Pl. 2 Fig. 24, Pl. 3 Fig. 25)

Material studied: ♂ holo-, ♀ allotype, labelled: Bougainville Togerao 600 m 15—21.4.1968, R. Straatman collector (BPBM); paratypes: similar label (1 juv. ♂ 3 ♀ 1 juv. ♀) (BPBM).

Description.

♂ (Pl. 2 Fig. 24). Body robust. Head moderately globose, eyes rather prominent. Fastigium verticis about as long as wide, apex wide and truncate, declivous in profile. Interocular distance about half as wide as the greatest width of the fastigium verticis. Pronotum longer than head, sulci deep. Elytron reaching middle of metanotum, elongate, margins subparallel, apex parabolic, slightly sclerotized.

Coloration scarlet red. Antennae dark blue. Head, thorax, elytra, abdomen and legs, scarlet red except the partly black mouthparts, bluish black apex of the knee-lobes of the fore and middle femora, and bluish black hind knee, base and apex of the hind tibia.

♀ (Pl. 3 Fig. 25). Completely black, except the dark brown elytra. Abdomen and legs with a shade of blue.

Measurements: l. of body ♂ 24.8, ♀ 31.2—33.3; l. of pronotum ♂ 5.0, ♀ 5.8—6.6; l. of elytron ♂ 1.4, ♀ 1.8—2.0; w. of elytron ♂ 0.8, ♀ 0.8—1.0; l. of hind femur ♂ 13.5, ♀ 16.0—16.5.

Distribution. Solomon Is.: Bougainville I.

Discussion. Characteristic are the robust body and the long pronotum with deep sulci. Sexual dichromatism is conspicuous. The juvenile male and female are both uniformly red, agreeing completely with the adult male, but they are strikingly different from the completely black adult female.

On Bougainville I. occurs also *bougainvillea*. Apart from the different colour, recognition of *unicolor* is possible by its more robust general appearance, slightly more globose head, more declivous fastigium verticis and deeper pronotal sulci.

Opiptacris bougainvillea Ramme, 1941

This species was described after a single male from Bougainville I. Apart from *unicolor*, described above, at least three different colour forms are recognized among the present material from this area, including Buka I. in the north and Fauro I. in the south. Morphologically, the forms agree with each other. Apparently they represent one taxonomic unit which is given specific rank. Each colour form occurs on a confined part of the range and is considered a subspecies. The form which occurs on Buka I. and the northern part of Bougainville I., agrees with the holotype of *O. bougainvillea* (male sex) and with that of *O. salomona* (female sex). The form occurring in the central and southern parts of Bougainville I. is described below as *bougainvillea femorata*, the one on Fauro I. as *bougainvillea fauroensis*.

Opiptacris bougainvillea bougainvillea Ramme, 1941
(Pl. 3 Fig. 26—27)

Opiptacris bougainvillea Ramme, 1941: 93; C. Willemse, 1956: 91, 92; Kevan, 1966: 409, 410 (partim).
Opiptacris salomona Ramme, 1941: 93; C. Willemse, 1956: 92, 93; Kevan, 1966: 409. Syn. nov.

Material studied: ♂ holotype of *O. bougainvillea*, labelled: Bougainville Dr. L. Cohn, Typus (ZMHU). Right antenna and right hind leg lacking.

♀ paratype of *O. salomona*, labelled: Südsee-Exp-Wolf 1909 Buka D. Salom. I.29.8. 09 40, Paratypus (ZMHU).

Additional material: Solomon Is., Buka I.: II.1964, R. Paine 10686 (1 ♀) & 10683 (1 ♂) (BMNH) (both slightly discoloured); Agric. Sta., 6—10.XII.1959, T. C. Maa (1 ♂) (BPBM); Gagan, 40 m, 15.VI.1956, J. L. Gressitt (1 ♂) (BPBM); Bougainville I.: NE, Mutahi, 700 m, 18 km SE. Tinputz, 1—7. & 15—21.III.1968, R. Straatman (5 ♂ 1 juv. ♂ 1 ♀) (BPBM).

Redescription.

♂ (Pl. 3 Fig. 26). Body slender. Head slightly globose, eyes slightly prominent. Fastigium verticis narrow, longer than wide, apex narrowly truncate, subhorizontal in profile and not or very slightly declivous. Interocular distance slightly longer than half the greatest width of the fastigium verticis. Pronotum slightly longer than head, sulci moderately deep. Elytron small, reaching middle of metanotum, as long as or longer than wide, apex parabolic, the elytron usually partly hyaline.

Coloration scarlet red and black. Antennae bluish black. Head black with fastigium verticis, face and lower anterior part of gena scarlet red, orange red or orange yellow. Thorax, coxae and abdomen scarlet red; tip of abdomen bluish black. Elytron coloured as thorax, partly hyaline. Fore and middle legs and hind femur black with a shade of red; lower inner marginal area as well as antegenicular ring of hind femur red. Hind knee, tibia and tarsus bluish black.

♀ (Pl. 3 Fig. 27). Colour black and red. Head and legs as in male. Thorax and abdomen black, but lower margin of pronotal lateral lobe, a wide band on each side of pronotal dorsum, and sclerotized part of elytron, red.

Measurements: l. of body ♂ 23.0—24.2 ♀ 29.8—31.0; l. of pronotum ♂ 4.2—4.6, ♀ 5.8—6.0; l. of elytron ♂ 0.6—1.1, ♀ 1.5—1.8; w. of elytron ♂ 0.6—0.7, ♀ 0.8—1.0; l. of hind femur ♂ 12.1—13.0, ♀ 15.1—16.4.

Distribution. Solomon Is.: Buka I. and Bougainville I.

Discussion. The slender appearance, comparatively long pronotum and moderately impressed sulci are characteristic features. "Elytren völlig fehlend", as recorded in the original description of *bougainvillea*, is incorrect. They are 0.6 mm long and wide, reaching middle of metanotum, and are almost completely transparent in the holotype. Conspicuous is the sexual dichromatism, by which Ramme was induced to describe male and female as distinct taxa. The synonymy of *O. bougainvillea* and *O. salomona* is apparent on the basis of the present material. The juvenile male is coloured as the adult one. The male from Gagan has the fore and middle legs red. As the black pigmentation of these parts in the other material has a distinct shade of red, this variation appears not to be important. The male from the Agriculture Station has been referred to this species by Kevan (1966).

Opiptacris bougainvillea femorata subspec. nov.

(Pl. 3 Fig. 28—29)

Opiptacris bougainvillea: Kevan, 1966: 409 (partim).

Material studied: ♂ holo-, ♀ allotype, labelled: Bougainville (S) Kokure 690 m, June 12 1956, E. J. Ford Jr. collector (BPBM); paratypes: similar label, 9. & 12.VI.1956 (1 ♂ 1 juv. ♂ 1 ♀ 1 juv. ♀); Mumurai, 400 m, 7.VI.1956, J. L. Gressitt (3 ♂); Boku, 50 m, 4. & 5.VI.1956, E. J. Ford Jr. (1 ♂ 1 juv. 1 ♀) (all BPBM).

Description.

♂ (Pl. 3 Fig. 28). Differing from nominate *bougainvillea* by the characteristic leg colour. Fore and middle pair scarlet red. Hind femur scarlet, but outer and upper sides of proximal half violaceous black. Hind knee and base of hind tibia dark blue. Hind tibia scarlet, spines dark blue. Hind tarsus bluish.

♀ (Pl. 3 Fig. 29). Resembling the nominate subspecies in colour, but head almost completely black, bands of pronotum wider and orange, and antegenicular ring of hind femur broader, slightly longer than the hind knee.

Measurements: l. of body ♂ 22.1—23.1, ♀ 30.9—31.2; l. of pronotum ♂ 4.0—4.6, ♀ 5.9—6.0; l. of elytron ♂ 0.7—1.2, ♀ 1.4—1.8; w. of elytron ♂ 0.4—0.8, ♀ 0.8—0.9; l. of hind femur ♂ 12.1—12.4, ♀ 15.5—16.0.

Distribution. Solomon Is.: Bougainville I.

Discussion. Sexual dichromatism is distinct. Colour of juvenile male similar to that of the adult, but that of juvenile and adult females, strikingly different. Head, thorax and abdomen of juvenile female red, compare a similar case in *unicolor*. A male from Kokure has been recorded previously (Kevan).

Opiptacris bougainvillea fauroensis subspec. nov.
(Pl. 3 Fig. 30)

Material studied: ♂ holotype, labelled: Solomon Is. Fauro I. NE 12.IV.1964, P. Shanahan collector (BPBM). The specimen lacks both antennae and right legs.

Description.

♂ (Pl. 3 Fig. 30). Unlike nominate *bougainvillea* by differently coloured head, pronotum and legs. Head, fore and middle legs orange red. Pronotum reddish black with anterior and posterior angles of lateral lobe orange red. Hind femur with extreme base and distal part orange red, the proximal two-thirds black with a shade of red, lower inner marginal area entirely red. Hind knee, tibia and tarsus as in nominate *bougainvillea*.

♀. Unknown.

Measurements (♂) : l. of body 24.0; l. of pronotum 4.5; l. of elytron 1.3; w. of elytron 0.8; l. of hind femur 13.1.

Distribution. Solomon Is.: Fauro I.

Discussion. The red head and black pronotum are characteristic. Fore and middle legs as in *bougainvillea femorata*, hind leg intermediate between those of nominate *bougainvillea* and *bougainvillea femorata*. The abdomen is similar in all three subspecies.

Opiptacris castanea Kevan, 1966
(Pl. 3 Fig. 31)

Opiptacris castanea Kevan, 1966: 408, Pl. 3 f.a,b.

Material studied: ♀ holotype, labelled: New Britain Gisiluve, Nakanai Mts. 1050 m July 25 1956, E. J. Ford Jr. collector, Opiptacris castanea n. sp. det. D. K. McE. Kevan 1965 Type (BPBM). The specimen now lacks both antennae and the left hind leg (present in the original description).

Redescription.

♂. Unknown.

♀ (Pl. 3 Fig. 31). The original description is extensive. Salient features are: the wide and globose head; wide interocular distance, which is as broad as the greatest width of the fastigium verticis; short and wide fastigium verticis, distinctly marked off from the rest of the vertex; the pronotum, which is slightly laterally compressed in the middle, with weak pronotal sulci; and especially the wide, apically truncated and comparatively large elytra.

Colour dark chestnut brown. Details are given in the original description.

Measurements (♀): l. of body 37.5; l. of pronotum 6.7; l. of elytron 3.2; w. of elytron 2.3; l. of hind femur 16.8.

Distribution. Bismarck Archipelago: New Britain.

Discussion. The species is well-defined, morphologically as well as in respect of colour.

Opiptacris alata spec. nov.
(Pl. 3 Fig. 32)

Material studied: ♂ holotype, labelled: Bismarck Arch.: Manus I.: Lorengau 1—85 m, VI.28—1959, J. L. Gressitt collector, Pandan (BPBM).

Description.

♂ (Pl. 3 Fig. 32). Body slender. Head moderately globose, face strongly wrinkled, eyes slightly prominent. Interocular distance slightly less than greatest width of fastigium verticis, which is as long as wide and, in profile, slightly declivous. Pronotum about as long and as wide as the head, slightly laterally compressed in the middle, sulci deep. Elytron comparatively very large and wide, reaching just beyond the hind margin of the metanotum, apex truncate, surface smooth and shiny.

Colour black, red and yellow. Antennae bluish black basally, dark brown distally, pale brown apically. Scape of antenna and fastigium verticis yellow. Head scarlet red, mouthparts black and yellow. First and second episterna, pronotum, meso- and metasterna, bluish black. Meso- and metanota, second epimerum, third episternum and epimerum, yellowish brown. Elytron shining bluish black. First abdominal tergite yellowish brown, rest of abdomen bluish black. Fore and middle legs bluish black. Hind femur and coxa lemon yellow. Hind knee, tibia and tarsus bluish black.

♀. Unknown.

Measurements (♂): l. of body 23.3; l. of pronotum 4.5; l. of elytron 2.2; w. of elytron 1.8; l. of hind femur 12.3.

Distribution. Bismarck Archipelago: Manus I.

Discussion. Like *castanea*, the species is well-defined.

Opiptacris spec.?

Opiptacris uniformis: Kevan, 1966: 410 (partim).

Material studied: 1 juvenile ♀, labelled: Poue Jobi Isl., D. New Guinea, T. Barbour coll. (ANSP). The specimen is strongly discoloured and shrivelled.

The specimen has been referred to *uniformis* (?) by Kevan (1966). A study of this specimen reveals a closer relationship to *Cranae* than to *Opiptacris*. Especially the pronotum does not agree with the latter genus. Whether or not *Opiptacris* occurs within the area of New Guinea is still an open question.

Bumacris C. Willemse, 1931

Previously, diagnostic emphasis was placed mainly on conspicuously different coloration. In the present study, however, the species are morphologically defined. The following characters are used: general appearance, the more or less pitted integument, head proportions, form and gibbosity of the pronotum, venation of the tegmina, phallic complex of the male, and the ovipositor and hind margin of the subgenital plate of the female. The internal female genitalia appear rather uniform within the genus.

The previously known species of the genus form a natural group. Among the ma-

terial at present available, two new species were found, one from Rendova I. and a second from San Cristoval I. While the Rendova species is much alike previously described members of the genus, the one from San Cristoval I. is conspicuously different. However, the genitalia of the latter agree with those of *Bumacris*. On the basis of this, the San Cristoval species may be allocated to *Bumacris*, but the other morphological characters justify the erection of a distinct subgenus.

Key to the subgenera of *Bumacris*

1. Tegmina with the venation well developed; elytron with anal fold, longitudinal veins not greatly thickened, archedictyon in basal half. Antennae longer than combined length of head and pronotum. Integument from slightly to moderately pitted . . . . . *Bumacris* s.str. C. Willemse
— Tegmina with sparse venation; elytron without anal fold, the veins greatly thickened, archedictyon throughout. Antennae shorter, as long as the combined length of head and pronotum. Integument smooth except for slightly pitted pronotal metazona . . . . . *Cristovalacris* subgen. nov.

Bumacris (Bumacris) C. Willemse, 1931

Bumacris C. Willemse, 1931: 348—350; 1935: 165—166; Uvarov, 1937: 16—17; C. Willemse, 1956: 10, 176—177; F. Willemse, 1966a: 37.

Type species: *Bumacris flavomaculata* C. Willemse, 1931.

Redescription.

♂ ♀. Size medium, robust. Integument finely to moderately pitted. Antennae filiform, longer than head and pronotum together, reaching just beyond base of hind femur, segments up to four or five times as long as wide. Fastigium verticis marked off from the rest of the vertex, transverse, in dorsal view scarcely impressed with anterior margin slightly curved, in profile sloping and merging in the frontal ridge; lateral carinae between the eyes poorly developed. Interocular distance about half as wide as the greatest width of the fastigium verticis. Eyes oblong, more or less prominent. Occiput more or less convex. Face more or less reclinate. Frontal ridge straight, sometimes slightly projecting between the antennal base, more or less deeply sulcated throughout, keels parallel and obtuse. Lateral facial keels present. Mouthparts and cheeks normally to strongly developed.

Pronotum subcylindrical. Prozona ranging from not to distinctly gibbose, both dorsally and laterally. Metazona more flattened dorsally, lateral 'shoulders' poorly developed. Dorsum of pronotum straight or saddle-shaped in profile, or with the prozona more or less gibbose. Lateral pronotal lobe about as long as high, or longer. As seen from above, the prozona parallel and the metazona slightly divergent, or pro- and metazona both divergent. Median carina poorly developed, no lateral carinae. Sulci more or less strong. First (submarginal) sulcus present on lateral lobe, second sulcus on dorsum, third and fourth sulci both on dorsum and lateral lobes, the latter three sulci cutting the median line. Metazona about two-fifths of the pronotal length. Anterior margin broadly rounded, posterior margin more or less angularly rounded in the middle. Lower margin

weakly sigmoid, anterior angle broadly rounded, posterior angle about rectangular and slightly or not produced posteriorly.

Prosternal tubercle straight, conical, apex obtusely pointed. Mesosternal lobes slightly wider than long, interspace about half as wide as a lobe and slightly broadening posteriorly. Metasternal lobes with a narrow interspace.

Tegmina reaching the hind knee, or shorter. Elytron with the anterior margin minutely serrate and with a more or less developed precostal lobe, archedictyon moderately developed in the basal third, slightly pilose along the anal fold.

Tympanum large, open. Distal abdominal sternites with brush-like groups of hairs. Hind femur reaching well beyond tip of abdomen, upper keel terminating into a short spine, Brunner's organ present. Both lower hind knee-lobes spined. Hind tibia slightly expanded apically, the margins acute and pilose, external apical spine present. Hind tarsus slightly shorter than half of the hind tibial length, third segment about as long as the first and second combined.

♂. Hind margin of last abdominal tergite shallowly excised medially. Supra-anal plate triangular, widened basally and with a moderate median impression, apex obtuse. Cerci conical, slender, straight, apex scarcely incurved and obtusely pointed, reaching just beyond tip of supra-anal plate. Subgenital plate subconical, apex obtuse, sometimes slightly produced.

Epiphallus bridge-shaped, divided, no ancorae, anterior process bubble-like, lophi large and hook-like, incurved. Ectophallic membrane on each side with a ventro-lateral sclerite. Cingulum with U-like zygoma and apodemes. Cingular rami joining each other dorso-posteriorly, forming a triangular process, situated above apex of phallus and covering tip of cingular valves. Arch of cingulum with a bar-like, dorso-posterior process of the rami. Basal penis valve with a gonopore process and connected with the apical penis valve by a narrow, but complete flexure. Cingular and apical penis valves strongly upcurved, narrow and elongate. Apex of cingular valve recurved and rounded. Tip of apical penis valve truncate or, in most species, rounded, in the latter case with or without a spoon-like emargination.

♀. Supra-anal plate tongue-like. Cerci short, conical, slightly outcurved. Subgenital plate elongate, hind margin more or less produced posteriorly, near middle with more or less developed teeth; the very middle of the hind margin is usually truncate and distinctly marked off from the egg-guide, but in some specimens of nominate *pagdeni* pointed and continuous with the egg-guide. Dorsal side of subgenital plate with a pair of round columellae. Ovipositor valves slender, elongate, straight or nearly so. Dorsal side of upper valve truncately or more gradually narrowing to scarcely curved apex. Dorso-lateral keel of upper valve entire from apex to base, or lacking in the proximal part. Lower keels of lower valve, upper keels of upper valve, and lower margin of lateral basi-valvular sclerite, spinulose or almost smooth. Ventral basi-valvular sclerite about twice as long as wide. Spermatheca with a wide, curved, pre-apical and a narrow, apical diverticulum.

Bumacris, being much related to the genus *Oxya* (compare the dorso-posterior process of the cingular rami), is placed naturally in the subfamily Oxyinae.

The genus *Bumacris* is distributed throughout the Solomon Islands.

Key to the species and subspecies of *Bumacris* (s.str.)

1. Elytron with a distinct yellow streak along the anal fold (CU_2 - IA) 2
— Elytron without a streak along the anal fold 5
2. Lateral pronotal lobe unicolorous yellow, orange or red 3
— Lateral pronotal lobe divided longitudinally into a black upper and a yellow lower part (Santa Isabel I., San Jorge I.) . . . . . *leveri* Uvarov (p. 148)
3. Femora scarlet red. Head large, eyes slightly prominent (Bougainville I.) . . . . . *bougainvillea* Ramme (p. 147)
— Femora cadmium yellow or orange. Head small, eyes more prominent 4
4. Femora cadmium yellow (Kolombangara I.) . . . . . *pagdeni kolombangarae* subspec. nov. (p. 151)
— Femora cadmium orange (New Georgia I.) . . . . . *pagdeni mundae* subspec. nov. (p. 151)
5. Tegmina abbreviated, not reaching tip of abdomen (Guadalcanal I.) . . . . . *monotona* C. Willemse (p. 144)
— Tegmina well developed, reaching tip of abdomen 6
6. Pronotum unicolorous black (Rendova I.) . . . . *rendovae* spec. nov. (p. 146)
— Pronotum differently coloured 7
7. Lateral pronotal lobe unicolorous yellow (Vella Lavella I.) . . . . . *pagdeni pagdeni* C. Willemse (p. 150)
— Lateral pronotal lobe partly black and yellow, orange or red (Malaita I., Santa Isabel I., Florida I., Guadalcanal I.) . . . . . *flavomaculata* C. Willemse (p. 142)

Bumacris (Bumacris) flavomaculata C. Willemse, 1931
(Fig. 14—24, 30—31, Pl. 3 Fig. 33, Pl. 4 Fig. 44)

Bumacris flavomaculata C. Willemse, 1931: 350, Fig. 4; 1935: 166; Ramme, 1941: 119; C. Willemse, 1956: 177, 179; F. Willemse, 1966a: 37; 1966b: 63; Kevan, 1966: 406.

Material studied: ♂ holotype, labelled: Buma (Malaita) Salomonen. V. 29 E. Paravicini, Bumacris flavomaculata nov. g. nov. sp. Det. C. Willemse, Type (NMB); 1 juv. ♀ with similar locality and identification labels (NMM).

Additional material: Malaita I.: Dala, 50 m, 4. (1 ♀) & 6—8. (3 ♂, 2 ♀) & 9—14. (2 ♂, 2 ♀) & 20. (1 ♂) & 21. (1 ♂) & 22. (1 ♂) VI. 1964, J. & M. Sedlacek (BPBM); Dala, 50 m, 20. VI. 1964, R. Straatman (1 ♀) (BPBM); Dala, 16. II. 1965, P. Greenslade (1 ♂) (BMNH); Auki, 2—20 m, 22. IX. 1957, J. L. Gressitt (1 ♂, 1 ♀) (BPBM); Auki, 2. V. 1963, M. McQuillan, cacao (1 ♂) (BMNH); 3 km N. of Auki, 30 m, 2. VI. 1964, J. & M. Sedlacek (1 ♀) (BPBM); 6 km N. of Auki, 60 m, 3. VI. 1964, J. & M. Sedlacek (1 ♂) (BPBM); E. of Kwalo (E. of Auki), 350 m, 29. IX. 1957, J. L. Gressitt (1 ♂, 2 ♀) (BPBM); Tangtalau - Kwalo, 200—350 m, 30. IX. 1957, J. L. Gressitt (1 ♀) (BPBM); Tangtalau, 150—200 m, 25. IX. 1957, J. L. Gressitt (1 ♀) (BPBM); Nuna Lava, 25 km NE. of Dala, 200 m, 16. VI. 1964, J. Sedlacek (1 ♂) (BPBM); Fulisago-Maelegwasu, 26. V. 1955, E. S. Brown (1 ♀) (BMNH); Baunani, 7. (1 ♂, 1 ♀) & 10. IX. (1 ♂) 1954 & 31. V. 1955 (1 ♀), E. S. Brown (BMNH); Haffina, 27. V. 1955, E. S. Brown (2 juv. ♀) (BMNH); Tanava, 22. I. 1965, P. Greenslade (1 ♀) (BMNH); Talifia, 28. I. 1965,

P. J. M. Greenslade (1 ♂) (BMNH); Sisiuva (?correct spelling), 26. I. 1965, P. J. M. Greenslade (1 ♂, 3 ♀) (BMNH); Araki, 24. IX. 1963, M. McQuillan (1 ♂) (BMNH); Makwanu, 25. IX. 1963, M. McQuillan (1 ♂, 2 ♀, 1 juv. ♀) (BMNH); Rerende, 24. IX. 1963, M. McQuillan (2 ♀) (BMNH).

Guadalcanal I.: Lunga R. (bridge), 3. IX. 1960, C. W. O'Brien (3 ♀) (BPBM).

Florida Is.: Nggela Is., Halaita, low herbage, 20. III. 1934, H. T. Pagden (1 ♀) (BMNH); Big Nggela, Sandflypassage, 14. I. 1964, P. Greenslade (1 ♀, 1 juv. ♀) (BMNH); Hanavaivine, Small Nggela, 15. IX. 1960, C. W. O'Brien (1 ♀) (BPBM).

Santa Isabel I.: Molao, 29. VI. 1960, C. W. O'Brien (2 ♂) (BPBM); Tatamba, 10. X. 1964, R. Straatman (1 ♀) (BPBM); Tatamba, forest and vegetation behind resthouse, 2. X. 1965, Roy. Soc. Exped. (1 ♂) (BMNH).

Redescription.

♂ (Pl. 3 Fig. 33). Robust. Integument moderately pitted. Head large. Interocular distance half as wide as greatest width of fastigium verticis. Eyes rather prominent. Occiput rather convex. Face moderately reclinate. Mouthparts and cheeks well developed, wide.

Pronotum with prozona parallel, metazona slightly divergent. Pronotal dorsum with prozona slightly gibbose, metazona more flattened, posterior margin angularly rounded. Lateral pronotal lobe with strong sulci; areas between sulci strongly gibbose and with irregular, strong impressions. Posterior angle of lower margin slightly produced.

Tegmina reaching tip of abdomen. Elytron wide, precostal lobe strongly developed, apex widely rounded.

Apex of subgenital plate slightly produced (Fig. 17—18). Cerci with apex obtusely pointed. Dorso-posterior process of cingular rami robust, apex widely rounded. Apical penis valve elongate, in ventro-posterior aspect flattened and gradually narrowing towards the rounded apex (Fig. 19—24).

Colour black and yellow. Antennae yellowish, brown, bluish or black; proximal segments paler. Head cadmium yellow; mouthparts black, sometimes with yellow dots; clypeal margin, lower and posterior margins of cheek and margins of eye black; face around and below antennal base with a black spot, the left and right one connected by a black spot on the frontal ridge at level of median ocellus; fastigium verticis, vertex between eyes, and from there a median band over the occiput strongly widening towards the pronotum, black; behind the eye a wide black band.

Pronotum cadmium yellow; dorsum with a broad, median, black band, slightly widening posteriorly and usually covering the metazona almost completely; upper part of metazona of lateral lobe black; gibbose areas between sulci of lateral lobe cadmium yellow, cadmium orange or scarlet red.

First episternum black. Pleurae, meso- and metasterna dark brown or black. Elytron yellowish brown, more greenish or bluish brown apically. Wings hyaline, colourless. Abdomen with tergites yellowish, brownish or blackish, and the sternites darker brown or black.

Fore and middle legs cadmium yellow, with apex of femora, apex and base of tibiae and third tarsal segments, black or dark brown. Hind femur black, or partly black and yellowish brown. Hind knee dark brown or black, lower lobes sometimes dark blue. Base of hind tibia black or dark blue, a wide postgenicular ring cadmium yellow and

the distal part completely black or dark blue, or partly yellowish brown with black margins. Spines black. Hind tarsus with first and second segments yellow, third segment and claws black or dark blue, and pulvillus yellowish.

♀ (Pl. 4 Fig. 44). Larger and more robust than the male. Pronotal dorsum, in profile, slightly constricted at the fourth sulcus, metazona flat and prozona slightly gibbose. Areas between sulci of pronotal lateral lobe strongly gibbose. Precostal lobe of elytron strong. Hind margin of subgenital plate (Fig. 31), truncate in the very middle and, on each side, with one short tooth; occasionally, more laterally, with some smaller teeth. Dorsal aspect of subgenital plate as in Fig. 16. Ovipositor valves (Fig. 14—15, 30—31) long, slender, keels slightly spinulose; dorsum of upper valve shallowly sulcate, lateral keel present from base to apex. Coloration as in male.

Variation.

Morphological variation is moderately, that in colour more distinctly developed. The black band over the occiput varies in width. The face may be almost completely black. The black band over the pronotal dorsum may be much narrower, resulting in wider yellow lateral parts of the metazona. The black pigmentation of the upper part of the metazona of the pronotal lateral lobe varies from almost lacking to extending much anteriorly over the prozona. The elytron may be cadmium yellow. The hind femur may be brown. The fore and middle femora of the males from Santa Isabel I. are completely black.

Measurements: ♂ holotype: body 23.5; pronotum 5.3; elytron 15.5; hind femur 14.3; other material: body ♂ 24.7—27.2, ♀ 30.4—35.0; pronotum ♂ 5.2—6.0, ♀ 7.2—8.1; elytron ♂ 15.0—17.8, ♀ 18.1—19.9; hind femur ♂ 14.8—16.2, ♀ 18.1—20.0.

Distribution. Solomon Is.: Malaita I., Guadalcanal I., Florida Is., Santa Isabel I.

Discussion. The species is well-defined by the strongly gibbose areas of the pronotal lateral lobe, wide elytron, phallic complex and colour. The phallic complex resembles that of *pagdeni* and *monotona*. Previously, the species has been recorded only from Malaita I. and Nggela I. On Guadalcanal I. *flavomaculata* occurs together with *monotona* and on Santa Isabel I. with *leveri*. The type locality of the latter is Tatamba, whence *flavomaculata* is now also known.

Bumacris (Bumacris) monotona C. Willemse, 1935
(Fig. 25, 32—33, Pl. 4 Fig. 40)

Bumacris monotona C. Willemse, 1935: 166; Ramme, 1941: 119; C. Willemse, 1956: 177, 179; F. Willemse, 1966a: 37.

Material studied: ♀ holotype, labelled: Solomon Islands Guadalcanal Is Tslouia 6.ii.1934 H. T. Pagden, 700, Bumacris monotona nov. sp. Dr. C. Willemse det., 1935, Type (BMNH). The specimen lacks the left hind leg.

Additional material: Guadalcanal I. (all BPBM): Kiwi Creek, 24. VIII. 1944, H. E. Milliron (1 ♂); Metanikan River (Mth.), 21. V. (1 ♂, 1 ♀) & 10. VI. (1 ♀) 1944, H. E. Milliron; Poha R., 5 m, 2.VII.1956, J. L. Gressitt (1 ♀); Suta (Suta — Gold Ridge) Jonapau Mt., 1000 m, 29. VI. 1956, J. L. Gressitt (1 ♀) Tenamba, 7. X. 1957, J. L. Gressitt (1 ♂); same island (all BMNH): Mt. Austin, 30. XII. 1962, R. W. Paine (1 ♂, 1 ♀); Avuliga (? correct spelling), 26.IV. 1956, E. S. Brown (1 ♂); Nalimbiu

R., 12. IX. (1 ♂, 2 ♀) & 23. XII. (3 ♂, 4 ♀, 1 juv. ♀) 1963, M. McQuillan; Suta, 27. VI. 1956, E. S. Brown (2 ♂, 1 juv. ♀); Kukum, 12. IV. 1956, E. S. Brown (1 ♀); Gold Ridge, 20. III. 1955, E. S. Brown (2 ♀); Nalimbiu Ridge, 10.III.1955, E. S. Brown (1 ♀); Tenavatu, 13.VII.1954, E. S. Brown (1 ♂); Tapenanje, 21—23. XII. (1 ♀) & 10—15.XII. (1 ♂) 1953, J. D. Bradley; Sutakiki R., 28.VI.1956, E. S. Brown (1 ♂, 1 ♀).

Redescription.

♂ (Pl. 4 Fig. 40). Smaller and less robust than the type species. Integument slightly pitted. Head smaller than in the latter, lateral carinulae of fastigium verticis less developed.

Pronotum with prozona parallel, metazona slightly divergent. Pronotal dorsum slightly saddle-shaped, prozona not gibbose, posterior margin more broadly, less angularly, rounded. Sulci less strong than in the type species. Areas between sulci of lateral lobe scarcely gibbose. Posterior angle of lower margin slightly produced.

Tegmina abbreviated, reaching about middle of hind femur, not nearly reaching tip of abdomen. Precostal lobe of elytron strong, apex of elytron narrower than in the type species.

Abdominal terminalia as in the type species, but smaller. Dorso-posterior process of cingular rami narrowly triangular, apex subacute. Apical penis valve more slender and smaller (Fig. 25).

Colour yellowish green. Antennae bluish black, proximal segments dorsally and tip of flagellum yellowish green. Head lemon yellow; lower and hind margins of cheeks and lower margin of eye black; mouthparts yellow, yellowish green or green; face, just below median ocellus with indication of a small black dot on each side; fastigium verticis yellow or dirty yellow; vertex between eyes, occiput, and area behind eye, completely black.

Pronotum dark or pale yellowish green, not quite unicoloured; sometimes, along anterior margin of pronotal dorsum an indistinct yellow lateral spot; lateral pronotal lobe unicoloured, but usually with two lemon yellow spots: a small one at lower anterior angle, and a larger one along lower margin between third sulcus and posterior margin.

First episternum as the pronotum. Pleurae black, except ventral yellow spots on the second and third episterna. Meso- and metasterna black or dark brown and yellow, the lobes usually yellow. Elytron pale or dark greenish with a shade of violaceous or metallic blue. Wings hyaline, with a shade of metallic blue. Abdomen yellowish brown, mottled with dark brown; hind margin of segments sometimes yellowish green. Cerci and supra-anal plate blackish brown, tip of supra-anal plate yellowish.

Fore and middle legs yellowish green or olivaceous green, the tibiae with a blue flush dorsally; knees bluish. Hind femur yellowish, yellowish green or olivaceous green; hind knee bluish, crescents dark brown or black. Hind tibia with basal part black, rest of the proximal half yellowish green, distal half similar or more blackish brown or blackish blue. Hind tarsus yellowish, except for a blue flush over the first segment dorsally, the apex of the third segment blue.

♀. Larger and more robust than the male. Pronotal dorsum distinctly saddle-shaped, the deepest point at the third or fourth sulcus. Precostal lobe of elytron strong. Subgenital plate (Fig. 33) as in the type species, but teeth of hind margin either much shorter or

almost lacking. Ovipositor valves (Fig. 32—33) as in the type species, but shorter; keels more finely spinulose. Colour as in male.

Variation.

Morphological variation is unapparent, except for the body-length. Colour of pronotum and elytra rather variable, as described above.

Measurements: ♀ holotype: body 29.1; pronotum 7.0; elytron 14.9; hind femur 20.0; other material: body ♂ 19.4—21.0, ♀ 23.0—29.8; pronotum ♂ 4.0—4.8, ♀ 5.5—7.0; elytron ♂ 7.7—10.6, ♀ 10.9—15.1; hind femur ♂ 11.4—14.2, ♀ 15.1—19.8.

Distribution. Solomon Is.: Guadalcanal I.

Discussion. The species is well-defined by the abbreviated tegmina, saddle-shaped pronotum, slightly pitted integument, phallic complex and colour. The dorso-posterior process of the cingular rami is the narrowest and the apical penis valves are the smallest of the genus. The species has been previously recorded only from the female holotype.

Bumacris (Bumacris) rendovae spec. nov.
(Fig. 26, Pl. 3 Fig. 35)

Material studied: ♂ holotype, labelled: Solomon Is., Rendova, 9.X.1954, E. S. Brown 1268A (BMNH).

Description.

♂ (Pl. 3 Fig. 35). Integument moderately pitted. Head differing from that of the type species by a more reclinate face and less developed cheeks and mouthparts.

Pronotum with prozona parallel, metazona slightly divergent. Pronotal dorsum with prozona distinctly gibbose, metazona more flattened, and posterior margin rather produced posteriorly and, in the middle, angularly rounded. Lateral lobe with moderate sulci; areas between sulci distinctly gibbose and with irregular impressions. Posterior angle of lower margin about rectangular, not produced.

Tegmina almost reaching tip of abdomen. Precostal lobe of elytron moderate, apex of elytron narrower than in the type species.

Abdominal terminalia almost as in the type species, but tip of apical penis valve different, being truncate and slightly excised (Fig. 26).

Colour black and yellowish green. Antennae dark brown, scape and pedicle yellowish. Head cadmium yellow; fastigium verticis, vertex, occiput and area behind eye completely black; frontal ridge between antennal base black; clypeal margin, lower margin of cheek, and anterior margin of eye black; mouthparts yellow and black; face, just below median ocellus, with pair of small black spots.

Pronotum and first episternum completely bluish black. Pleurae bluish black, except ventral yellow spots on the second and third episterna. Meso- and metasterna yellow and blackish brown. Abdomen yellowish brown. Elytron yellowish green. Wings hyaline with a faint tinge of metallic blue.

All legs bluish black, but pulvilli, first and second tarsal segments and claws yellowish brown. Crescents of hind knee dark chestnut brown. Hind tibial spines coloured similarly to hind tibia, tips black.

♀. Unknown.

Measurements: ♂ holotype: body 24.9; pronotum 6.6; elytron 15.6; hind femur 17.1.

Distribution. Solomon Is.: Rendova I.

Discussion. The species is well-defined by the form of the pronotum, apex of phallus, and colour. Except that of the pronotum and legs, the colour is much as in *monotona.* No other species of the genus are known from Rendova I.

Bumacris (Bumacris) bougainvillea Ramme, 1941

(Fig. 27, 34—35, Pl. 3 Fig. 34, Pl. 4 Fig. 45)

Bumacris bougainvillea Ramme, 1941: 118, 218; C. Willemse, 1956: 177, 178.

Material studied: ♂ holotype, labelled: Bougainville Nauer, Typus (ZMHU). The specimen lacks the left elytron and right antenna.

Additional material: Solomon Is., Bougainville I.: Mutahi, 18 km SE. of Tinputz, 700 m, 1—7. III. 1968, R. Straatman (1 ♀); Kukugai Vill., 150 m, X. (1 ♂) & XII. (1 ♀) 1960, W. W. Brandt; Mumurai, 8. VI. 1956, J. L. Gressitt (1 ♀); Kokure, 690 m, 10—18. VI. 1956, E. J. Ford Jr. (3 ♂, 5 ♀); Kokure, nr. Crown Prince Ra., 900 m, 8. VI. 1956, J. L. Gressitt (1 ♂, 2 ♀); Guaka, 100 m, 19. VI. 1956, E. J. Ford Jr. (1 ♀) (all BPBM).

Redescription.

♂ (Pl. 3 Fig. 34). Integument moderately pitted. Head much as in the type species.

Pronotum with prozona parallel, metazona slightly divergent. Pronotal dorsum with prozona scarcely gibbose and metazona more flattened, the posterior margin as in the type species. Lateral pronotal lobe slightly longer than high; sulci moderately strong; areas between sulci scarcely gibbose and with irregular impressions.

Tegmina reaching base of hind knee. Elytron narrower, precostal lobe less strongly developed and apex narrower, than in the type species.

Abdominal terminalia also similar, but tip of apical penis valve different, bearing a spoon-like excavation (Fig. 27).

Colour black, orange or red. Antennae cadmium orange, joints of segments dark. Head cadmium orange; clypeal margin, lower and hind margins of the cheek, and eye-margins black; mouthparts yellow and blackish; fastigium verticis, vertex between eyes, and from there a strongly widening band over the occiput, black.

Pronotal dorsum black, lateral lobe cadmium orange or scarlet red. Sterna and pleurae orange or scarlet red, margins and sutures black. Abdomen yellowish brown. Elytron violaceous or brownish black, with a yellow streak along anal fold. Wing hyaline with a faint tinge of violaceous.

Femora scarlet red. Hind femur before the knee more cadmium yellow. Knees and base of tibiae black. Hind tibia cadmium orange, but margins distally and occasionally the dorsal side also, blackish green. Spines blackish, tips black. Hind tarsus cadmium orange.

♀ (Pl. 4 Fig. 45). Larger than the male. Pronotum slightly saddle-shaped. Abdominal terminalia as in the type species, but ovipositor valves (Fig. 34—35) slightly shorter and wider; dorsum of upper valve without, or with poorly developed, lateral keel. Colour as in male.

Variation in morphology and colour is slight. The holotype, rather more yellow than orange, is slightly discoloured.

Measurements: ♂ holotype: body 24.6; pronotum 5.6; elytron 19.2; hind femur 15.6; other material: body ♂ 24.8—27.8, ♀ 30.0—33.9; pronotum ♂ 5.6—6.0, ♀ 7.0—7.8; elytron ♂ 16.9—19.0, ♀ 21.1—23.8; hind femur ♂ 14.2—16.2, ♀ 18.1—19.2.

Distribution. Solomon Is.: Bougainville I.

Discussion. The species is well-defined by the shape of the pronotum, apex of phallus and colour. The apex of the phallus resembles that of *leveri*. Up to now, only the male holotype has been recorded. No other species of the genus are known from Bougainville I.

Bumacris (Bumacris) leveri Uvarov, 1937

(Fig. 28, 36—37, Pl. 4 Fig. 39)

Bumacris leveri Uvarov, 1937: 17; Ramme, 1941: 119; C. Willemse, 1956: 177.
Bumacris georgica C. Willemse, 1962: 51, Fig. 4; F. Willemse, 1966a: 37. **Syn. nov.**

Material studied: ♀ holotype of *leveri*, labelled: Solomon Is. Isabel Tatamba 30.VI. 1935, R. A. Lever, Calamus leaf, 4799, Bumacris leveri sp. n. Det. B. Uvarov 1936, Type (BMNH). The specimen lacks the left hind leg and right antenna.

♂ holotype of *georgica*, labelled: Muséum Paris Arch. Salomon I. San George Hombron 1841, 1674 41, Bumacris georgica n. sp. Det. C. Willemse (MNHN). The specimen lacks both middle legs and antennae, and the left tegmina are spread.

Additional material: Santa Isabel I.: Tatamba, 21. III. (1 juv. ♀) & 24. (2 ♀) & 27. (1 ♂, 1 ♀) V. 1963 & 7. II. 1964 (1 juv. ♂), M. McQuillan; Rasa, 9. (1 ♀) & 20. (1 ♂) III. & 23. (1 ♀) & 30. (2 ♂) IV. 1963, M. McQuillan; Tolana, 5. III. 1964, M. McQuillan (1 juv. ♀); Burta, 2. VIII. 1962, P. Greenslade (1 ♂); 3 mls. W. of Cockatoe Is., 700′, laterite slope and fringe of Casuarina forest, 20. IX. 1965, Roy. Soc. Exped. (1 ♀) (all BMNH).

San Jorge I.: 2. III. 1962, P. Greenslade (1 ♂) (BMNH).

Redescription.

♂ (Pl. 4 Fig. 39). Slender. Integument moderately pitted. Head not large, cheeks and mouthparts of normal proportions, eyes slightly prominent.

Pronotum comparatively long, prozona parallel, metazona slightly divergent. Prozona distinctly gibbose both dorsally and laterally. Lateral pronotal lobe distinctly longer than high; sulci moderate; gibbose areas with moderate impressions. Margins of pronotum and angle of lateral lobe as in the type species.

Tegmina reaching the hind knee. Elytron longer and narrower, the precostal lobe smaller and the apex narrower, than in the type species. Legs slender.

Abdominal terminalia similar, but apical penis valve distinct (Fig. 28), with spoon-like excavated tip.

Colour black, yellow and red. Antennae blackish green. Head cadmium yellow; face with the frontal ridge, and a large triangular spot, from the clypeal margin narrowing towards median ocellus, black; mouthparts for the greater part black; lower and hind

margins of the cheek and eye-margins black; fastigium verticis, vertex between the eyes and from there a narrow median stripe, widening posteriorly of the occiput, black; behind the eye a wide black band.

Pronotum cadmium yellow, dorsum with a broad median band and most of the upper part of the lateral lobe, black. Upper half of pleurae black, lower half cadmium yellow. Meso- and metasterna black, blackish brown and yellow. Abdomen dark brown, tergites laterally more yellowish. Elytron and wing azure blue; elytron with a yellow streak along anal fold.

Femora dirty scarlet red. Fore and middle knees, tibiae and tarsi blackish green. Hind femur with indistinct antegenicular yellowish ring. Hind knee black. Hind tibia with the base black, proximal half bluish green and distal half azure blue. Tibial spines tipped with black. Hind tarsus pale blue.

♀. Larger than male. Pronotal dorsum with prozona distinctly gibbose, metazona more flattened; in profile, slightly constricted at the fourth sulcus. Abdominal terminalia as in the type species, except for the ovipositor. Ovipositor valves (Fig. 36—37) slender, long and narrow, the keels almost smooth; dorsum of upper valve not sulcate and gradually narrowing towards apex.

Variation not apparent. A male from Burta, Santa Isabel I. is more robust; the slight difference in colour of the San Jorge I. material is discussed below.

Measurements: ♀ holotype *leveri*: body 36.2; pronotum 9.0; elytron 23.1; hind femur 22.0; other material: body ♂ 30.0—31.3, ♀ 36.7—39.4; pronotum ♂ 6.7—7.0, ♀ 8.5—8.9; elytron ♂ 22.0—22.2, ♀ 23.6—24.6; hind femur ♂ 18.8—19.0, ♀ 22.0—22.1.

Distribution. Solomon Is.: Santa Isabel I., San Jorge I.

Discussion. The slender general appearance, shape of pronotum, ovipositor valves, apex of phallus, and the colour, are characteristic features of this species. Up to now, *leveri* was only known from the female holotype. The apex of phallus resembles that of *bougainvillea*. At the type-locality of *leveri* also *flavomaculata* was found.

B. georgica was described after a single male from San Jorge I. A second, topotypic, male is before me. Morphologically, both males are similar to *leveri*. The only difference between them is found in the colour of the elytron and the hind tibia, which are bluish green in *georgica*, azure blue in *leveri*, both *georgica* males being, moreover, slightly discoloured. On the basis of this slight difference, these taxa are here considered synonymous.

Bumacris (Bumacris) pagdeni C. Willemse, 1935

This species was described after material from Vella Lavella. I have before me material from two other islands, Kolombangara I. and New Georgia I. In many respects specimens from these islands are similar, resembling *pagdeni* as well. Other characters are, however, quite distinctive. The material from each of these islands being clearly recognizable, a separation into subspecies seems to be justified. A key is given above.

Bumacris (Bumacris) pagdeni pagdeni C. Willemse, 1935
(Fig. 29, 38—39, Pl. 3 Fig. 36, Pl. 4 Fig. 41)

Bumacris pagdeni C. Willemse, 1935: 167; Ramme, 1941: 119; C. Willemse, 1956: 177, 178; F. Willemse, 1966a: 37.

Material studied: ♂ holotype, labelled: Solomon Is Vella Lavella, Liangi H. T. Pagden 20.V.1934 jungle 1661, Bumacris pagdeni nov. sp. Dr. C. Willemse det., 1935, Type (BMNH). The specimen lacks the right fore leg and both antennae.

Additional material: Vella Lavella: 30.VIII.1964, M. McQuillan (1 ♂, 2 ♀) (BMNH); Ulo Crater, 10 m, 7. (1 ♀) & XII. (2 ♀, 1 juv. ♀) 1963, P. Shanahan (BPBM); Kundurumbangara, 80 m, 15. XI. 1963, P. Shanahan (1 ♀) (BPBM).

Redescription.

♂ (Pl. 3 Fig. 36). Body slightly tapering. Integument moderately pitted. Head of normal size; face distinctly reclinate, eyes rather prominent, occiput rather convex, interocular distance slightly less than half the greatest width of the fastigium verticis.

Pronotum subcylindrical, divergent throughout, no gibbose areas. Pronotal dorsum straight in profile, posterior margin moderately angularly rounded. Sulci moderate.

Tegmina reaching base of hind knee. Elytron narrower than in the type species, with well developed precostal lobe, and narrowly rounded apex.

Abdominal terminalia similar, but apical penis valve longer and more elongate (Fig. 29).

Colour cadmium yellow, greenish and bluish black. Antennae yellowish or olivaceous black. Head cadmium yellow; face heavily mottled with black, or only the sulcus of the frontal ridge and two spots below the antennal base, black; mouthparts black and yellow; clypeal margin, lower and hind margins of the cheek, and the eye-margins, black; fastigium verticis, vertex between the eyes and from there a strongly widening median band over the occiput, black.

Pronotum cadmium yellow, dorsum with a wide median blackish band, sometimes less dark on the metazona; sulci and most of the surface impressions blackish.

First episternum, meso- and metasterna black. Pleurae for the greater part cadmium yellow. Abdomen dark brown, tergites laterally yellowish brown. Elytron greenish or brownish black. Wings hyaline, basally faintly bluish.

Fore and middle legs cadmium yellow, but knees, base and apex of tibiae and all tarsi, blackish. Hind femur cadmium yellow. Hind knee blue, crescents dark chestnut brown. Hind tibia blue, with indistinct yellowish postgenicular ring; spines blue, tips black. Hind tarsus pale or dark brown.

♀ (Pl. 4 Fig. 41). Larger than the male. Abdominal terminalia (Fig. 38—39) as in the type species, except one specimen, which has the hind margin of the subgenital plate not truncated apically but pointed and continuous with the egg-guide.

Variation is not noticeable.

Measurements: ♂ holotype: body 24.1; pronotum 5.1; elytron 16.9; hind femur 15.2; other material, only ♀: body 29.1—34.5; pronotum 7.1—8.2; elytron 20.0—22.1; hind femur 18.1—19.2.

Distribution. Solomon Is.: Vella Lavella I.

Discussion. The species is well recognizable, especially by the form of the pronotum.

The phallic complex resembles that of *flavomaculata* and *monotona*, but is slightly different by longer and more elongate apical penis valves. No other species are known from Vella Lavella I.

Bumacris (Bumacris) pagdeni kolombangarae subspec. nov.
(Pl. 4 Fig. 37, 43)

Material studied (all BPBM): ♂ holo- and ♀ allotype, labelled: Solomon Is New Georgia Group, Kolombangara, Iriri 100 m, 30.VI.1964, J. & M. Sedlacek collectors Bishop; paratypes: Solomon Is., New Georgia Gr., Kolombangara I.: Iriri, 2 m, 29. VI. 1964, J. & M. Sedlacek (1 ♂); Pepele, 0—30 m, 31. I. 1964, Shanahan (1 ♂).

Description.

♂ ♀ (Pl. 4 Fig. 37, 43). Differs from nominate *pagdeni* by the slightly gibbose prozona of the pronotum. The hind margin of the female subgenital plate as in the type species.

The coloration of the sexes is similar and differs from nominate *pagdeni* by a black upper part of the face, a wider black band over the pronotal dorsum, and the presence of a yellow streak along the anal fold of the elytron.

Marked variation not observed.

Measurements: ♂ holo- and ♀ allotype: body ♂ 26.1, ♀ 31.5; pronotum ♂ 6.0, ♀ 7.8; elytron ♂ 17.2, ♀ 20.1; hind femur ♂ 15.8, ♀ 18.1; other material, only ♂: body 24.1—25.3; pronotum 5.8—6.0; elytron 16.1—16.6; hind femur 15.9—16.1.

Distribution. Solomon Is.: Kolombangara I.

Discussion. Further analysis is needed to establish the categorial rank of this taxon. From Kolombangara I. no other member of the genus is known.

Bumacris (Bumacris) pagdeni mundae subspec. nov.
(Fig. 40—41, Pl. 4 Fig. 38, 42)

Material studied: ♂ holo-, ♀ allotype, labelled: Solomon Is. New Georgia Group, N. Georgia I., Munda, 1—30 m, 20. VII. 1959, J. L. Gressitt collector (BPBM) (the allotype lacks its right hind leg); paratypes: Solomon Is., New Georgia I.: Munda, 1—30 m, 15.VII.1959, J. L. Gressitt (2 ♂) (BPBM); Munda, 18.VIII.1963, M. McQuillan (1 ♂, 1 ♀, 3 juv. specimens, all slightly discoloured) (BMNH).

Description.

♂ ♀ (Pl. 4 Fig. 38, 42). Both sexes differ from nominate *pagdeni* by their distinctly more tapered body, somewhat saddle-shaped pronotum and slightly shorter tegmina. The female terminalia are as in Fig. 40—41.

The colour of both sexes is similar; they differ from nominate *pagdeni* by having black pigmentation on the upper part of the face, a wider black band over the pronotal dorsum, a yellow streak along the anal fold of the elytron, and the femora coloured cadmium orange.

No noticeable variation.

Measurements: ♂ holo- and ♀ allotype: body ♂ 22.5, ♀ 27.2; pronotum ♂ 5.4, ♀ 6.4; elytron ♂ 15.0, ♀ 17.1; hind femur ♂ 14.8, ♀ 18.0; other material, ♂: body 22.1—24.1; pronotum 5.0—5.3; elytron 14.1—15.3; hind femur 14.3—15.1.

Distribution. Solomon Is.: New Georgia I.

Discussion. The distinction between *kolombangarae* and *mundae* is less evident than that between these and nominate *pagdeni*. The more tapering body, somewhat shorter tegmina, slightly dissimilar form of pronotum, and cadmium orange femora in *mundae*, are distinct from *kolombangarae*. From New Georgia I. no other member of the genus is known. As in *kolombangarae*, further study is needed to establish the categorial rank of *mundae*.

Bumacris (Cristovalacris) subgen. nov.

Description.

♂ ♀. Differs from nominate *Bumacris* as follows. Body short and wide. Integument smooth, except a slightly pitted pronotal metazona. Antennae shorter, about as long as combined length of head and pronotum. Head and eyes comparatively small. Tegmina with sparse venation. Elytron without anal fold, the veins strongly thickened, archedictyon throughout. Genitalia as in nominate *Bumacris*.

Type species: *Bumacris (Cristovalacris) venosa* spec. nov.

Bumacris (Cristovalacris) venosa spec. nov.
(Fig. 42—44, Pl. 4 Fig. 46—47)

Bumacris sp.? nov. Kevan, 1966: 406.

Material studied: ♂ holotype, labelled: Solomon Is. San Cristoval, Kira Kira, 30. VII. 1960, C. W. O'Brien collector (BPBM); ♀ allotype, labelled: Solomon Is. San Cristoval, Kira Kira, 10. XI. 1964, R. Straatman collector (BPBM); paratypes: Solomon Is., San Cristoval I.: Bweinaniawarikiapu, 12. VIII. 1960, C. W. O'Brien (1 ♀) (BPBM); Waranito R., 175′, Camp site, 2317, 1965, P. J. M. Greenslade (1 ♂) (BMNH); Pamua, W. M. Mann, MCZ (1 ♀) (ANSP).

Description.

♂ (Pl. 4 Fig. 46). Size medium, body slightly tapering. Antennae reaching base of middle leg. Interocular distance less than half the greatest width of fastigium verticis. Lateral facial keel obtuse, almost lacking. Frontal ridge shallowly sulcate, keels indistinct.

Pronotum almost cylindrical, prozona parallel, metazona divergent, lateral 'shoulders' not present. Pronotal dorsum straight in profile, cut by the transverse sulci. Lateral pronotal lobe longer than high; sulci strong, first (submarginal) sulcus extending over dorsum; areas between sulci slightly gibbose. Surface of metazona and of a narrow area along anterior margin, slightly pitted. Anterior margin broadly rounded, posterior margin rather produced posteriorly and, in the middle, angularly rounded. Anterior angle of lateral lobe weakly pronounced, posterior angle rectangular, rounded.

Tegmina reaching middle of hind femora but not apex of abdomen. Elytron with precostal lobe well developed and margins narrowing towards a narrowly rounded apex. Wings subcycloid.

Apex of subgenital plate obtuse. Phallic complex as in nominate *Bumacris*. Apex of phallus (Fig. 42) about as in *monotona*.

Colour olivaceous yellow with black markings. Antennae blackish brown. Head olivaceous yellow; lower part of face with two small black points on each side; frontal ridge in lower half and middle black; upper half of face with narrow black stripe on each side, running parallel to the frontal ridge from the fastigium verticis to level of median ocellus, where left and right stripes are connected by a short, transverse, black stripe; mouthparts black; fastigium verticis, vertex between eyes, occiput and area behind eye black; occiput with two narrow, longitudinal, olivaceous yellow stripes; upper part of cheek and anterior margin of eye black.

Pronotum olivaceous yellow; dorsum black between second and fourth sulci; lateral lobe between first (submarginal) and fourth (typical) sulci, for the greater part black.

First episternum black with a round, olivaceous yellow spot. Pleurae black with large, olivaceous yellow spots. Meso- and metasterna yellow with the sutures and margins black. Elytron brownish with olivaceous yellow veins. Wing colourless, veins brown, the anterior margin slightly infumate. Abdomen blackish brown, but sternites, hind margin of tergites, tip of cercus, and subgenital plate, yellowish.

Coxae blackish brown. Fore and middle femora and tibiae dark red, but apical part of femora, base and apex of tibiae violaceous black. Fore and middle tarsi orange, but third segment and claws violaceous black. Hind femur and tibia violaceous black, crescents dark chestnut brown and a wide postgenicular ring, red. Hind tarsus orange, third segment with a shade of violaceous apically.

♀ (Pl. 4 Fig. 47). Body more tapering and larger than in male. Hind margin of subgenital plate (Fig. 44) slightly excised in the middle, laterally with one larger and some minute spines. Ovipositor valves (Fig. 43) slender, keels spinulose; upper valve shallowly sulcate dorsally. Colour as in male.

No noticeable variation.

Measurements: ♂ holo- and ♀ allotype: body ♂ 19.1, ♀ 27.0; pronotum ♂ 5.5, ♀ 7.6; elytron ♂ 9.2, ♀ 12.8; hind femur ♂ 13.4, ♀ 16.4; other material: body ♂ 21.8, ♀ 25.3—26.0; pronotum ♂ 5.8, ♀ 7.1—7.5; elytron ♂ 10.2, ♀ 12.2—12.4; hind femur ♂ 14.1, ♀ 16.0—16.2.

Distribution. Solomon Is.: San Cristoval I.

Discussion. The species is well-defined and, except for the genitalia, quite distinct among *Bumacris*. The female from Pamua has been recorded by Kevan (1966). As far as known, San Cristoval I. is the southernmost part of the range of the genus. No other member of the genus is known from this island.

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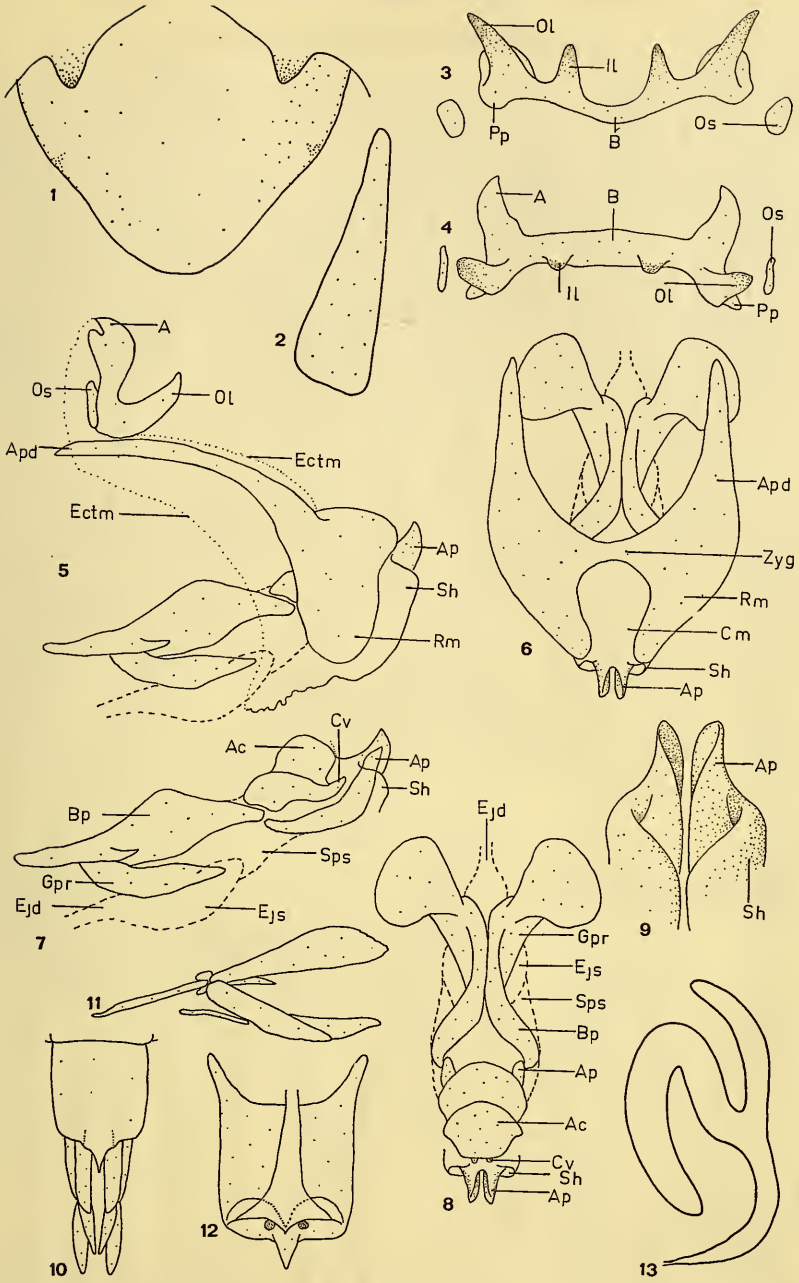

Fig. 1—2. *Opiptacris novageorgica* sp. n., male (paratype): 1, furculae and supra-anal plate; 2, left cercus, lateral view. Fig. 3—9. *Opiptacris uniformis cephalica* subsp. n., male (paratype): 3, epiphallus, posterior view; 4, same, dorsal view; 5, phallic complex, entire, lateral view; 6, same, dorsal view, epiphallus and ectophallic membrane removed; 7, endophallus, lateral view; 8, same, dorsal view; 9, apex of phallus, ventro-posterior view (*A*, ancorae of epiphallus; *Ac*, arch of cingulum; *Ap*, apical valve of penis; *Apd*, apodeme of cingulum; *B*, bridge of epiphallus; *Bp*, basal valve of penis; *Cm*, central ectophallic membrane; *Cv*, cingular valve; *Ectm*, ectophallic membrane; *Ejd*, ejaculatory duct; *Ejs*, ejaculatory sac; *Gpr*, gonopore process; *Il*, inner lophus of epiphallus; *Ol*, outer lophus of epiphallus; *Os*, oval sclerite; *Pp*, posterior process of epiphallus; *Rm*, ramus of cingulum; *Sh*, sheath of penis; *Sps*, spermatophore sac; *Zyg*, zygoma of cingulum). Fig. 10—13. *Opiptacris novageorgica* sp. n., female (paratype): 10, abdominal terminalia, ventral view; 11, ovipositor, lateral view; 12, subgenital plate, dorsal view; 13, spermatheca

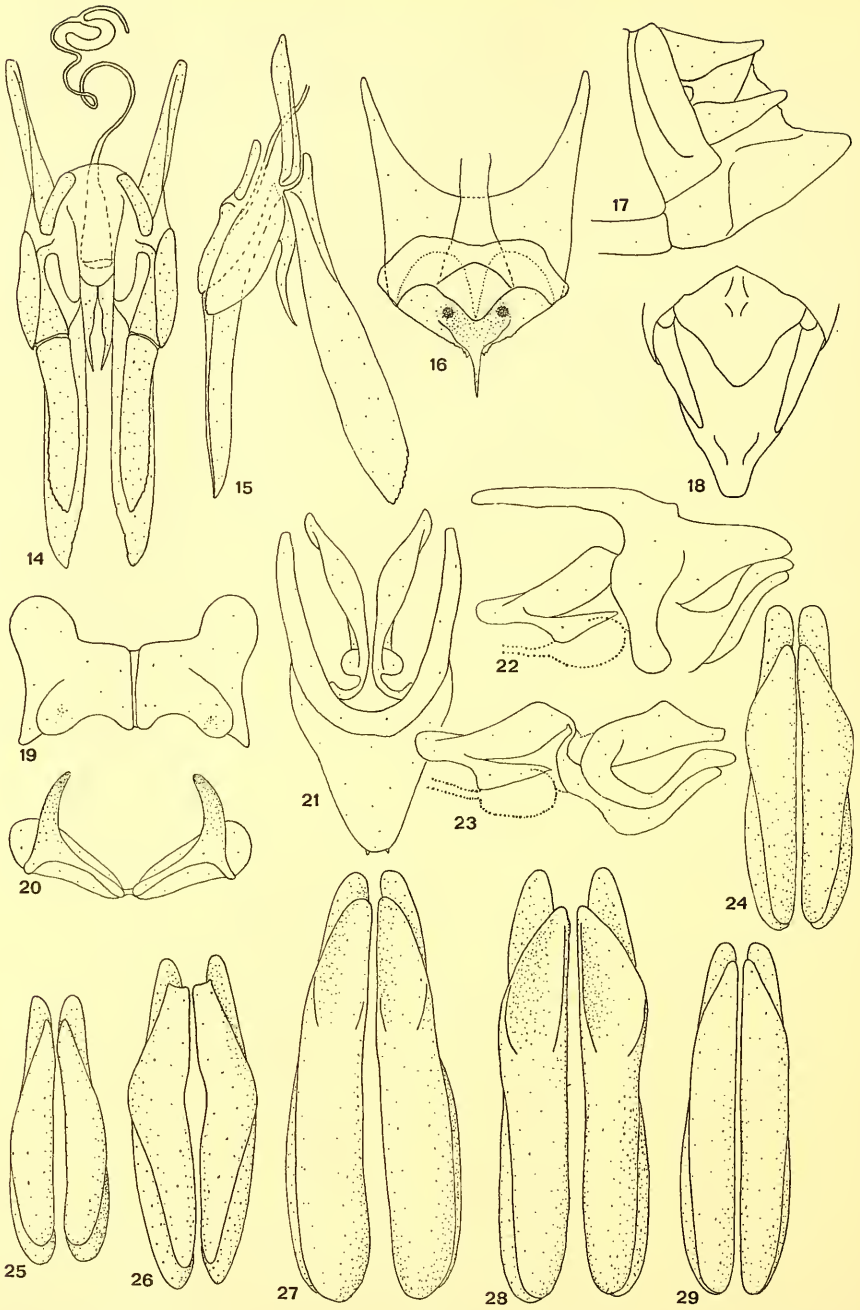

Fig. 14—16. *Bumacris* (s.str.) *flavomaculata* C. Willemse, ♀ (Dala). 14, ovipositor, ventral view; 15, same, lateral view; 16, subgenital plate, dorsal view. Fig. 17—23. Idem, ♂ (Dala). 17, tip of abdomen, lateral view; 18, the same, dorsal view; 19, epiphallus, dorsal view; 20, same, posterior view; 21, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 22, same, lateral view; 23, endophallus, lateral view. Fig. 24—29. *Bumacris* (s.str.) species, ♂, tips of cingular and apical penis valves, ventro-posterior view. 24, *flavomaculata* C. Willemse (Dala); 25, *monotona* C. Willemse (Trapenanje); 26, *rendovae* sp. n. (holotype); 27, *bougainvillea* Ramme (Kukugai Vill.); 28, *leveri* Uvarov (topotype); 29, *pagdeni pagdeni* C. Willemse (holotype)

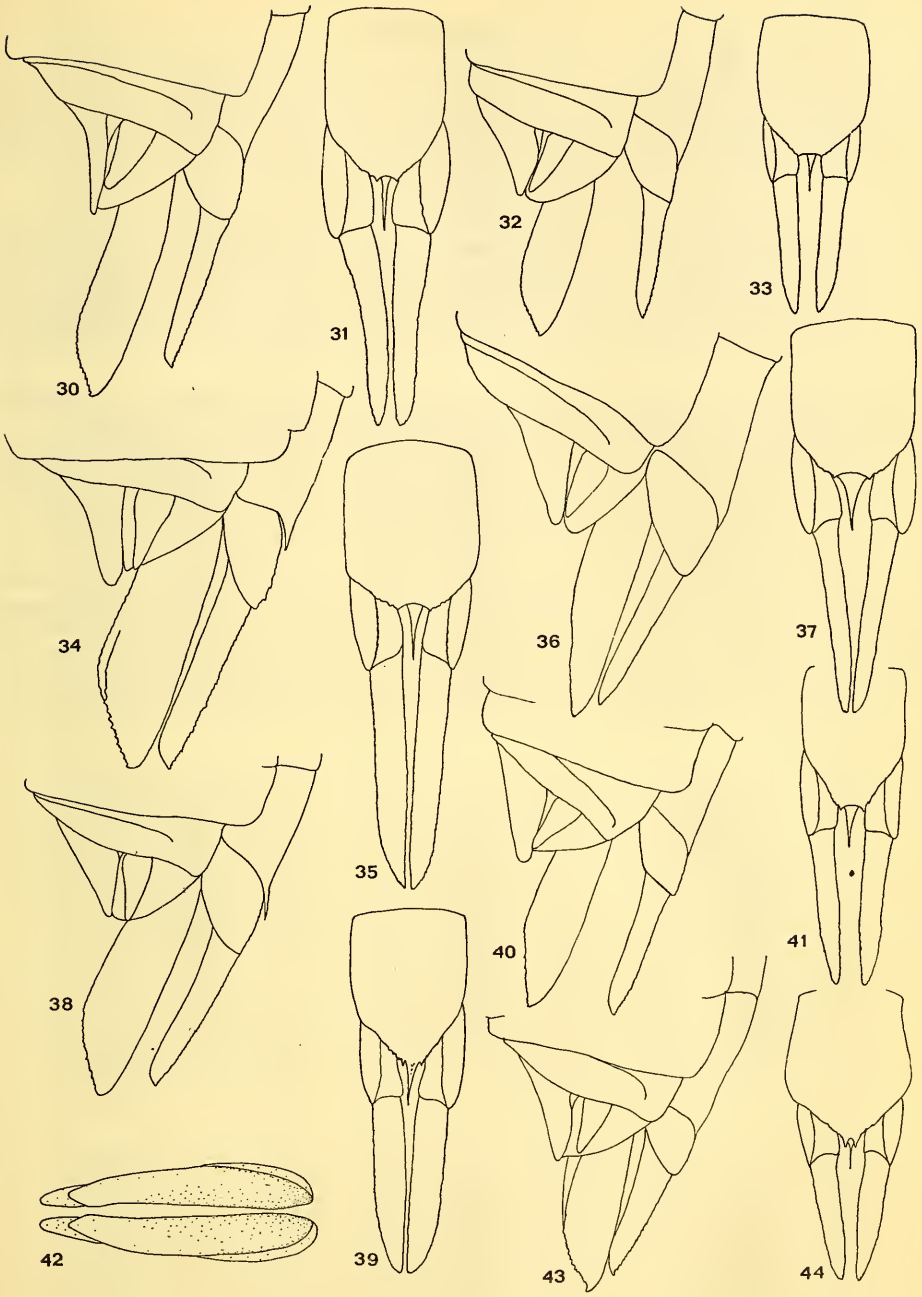

Fig. 30—41. *Bumacris* (s.str.) species, ♀, tip of abdomen in lateral (even numbers) and ventral (odd numbers) view. 30—31, *flavomaculata* C. Willemse (Tangtalau); 32—33, *monotona* C. Willemse (Nalimbiu R.); 34—35, *bougainvillea* Ramme (Mutahi); 36—37, *leveri* Uvarov (topotype); 38—39, *pagdeni pagdeni* C. Willemse (Ulo Crater); 40—41, *pagdeni mundae* ssp. n. (allotype). Fig. 42—44. *Bumacris* (*Cristovalacris*) *venosa* subgen. & sp. n. 42, ♂ (paratype), cingular and apical penis valves, ventro-posterior view; 43—44, ♀ (allotype), tip of abdomen, lateral view (43), same, ventral view (44)

EXPLANATION OF PLATES

Fig. 1—12. *Opiptacris* species and subspecies. 1, *hilaris* Walker, ♂ (holotype); 2, *ruficeps ruficeps* (C. Willemse), ♂ (Dala); 3, same, ♀ (Dala); 4, *ruficeps aberrans* ssp. n., ♂ (holotype); 5, same, ♀ (allotype); 6, *tenuis* sp. n., ♂ (holotype); 7, same, ♀ (allotype); 8, *tulagii* Uvarov, ♀ (holotype); 9, *novageorgica* sp. n., ♂ (holotype); 10, same, ♀ (allotype); 11, *vellalavellae* ssp. n., ♂ (holotype); 12, same, ♀ (allotype)

Fig. 13—24. *Opiptacris* species and subspecies. 13, *uniformis georgica* C. Willemse, ♀ (San Jorge); 14, *uniformis cephalica* ssp. n., ♂ (holotype); 15, same, ♀ (allotype); 16, *uniformis tricolor* ssp. n., ♂ (holotype); 17, same, ♀ (allotype); 18, *uniformis bicolor* ssp. n., ♂ (holotype); 19, same, ♀ (allotype); 20, *uniformis striata* ssp. n., ♂ (holotype); 21, same, ♀ (allotype); 22, *choiseulensis* sp. n., ♂ (holotype); 23, same, ♀ (allotype); 24, *unicolor* sp. n., ♂ (holotype)

Fig. 25—32. *Opiptacris* species and subspecies. 25, *unicolor* sp. n., ♀ (allotype); 26, *bougainvillea bougainvillea* Ramme, ♂ (Mutahi); 27, same, ♀ (Mutahi); 28, *bougainvillea femorata* ssp. n., ♂ (holotype); 29, same, ♀ (allotype); 30, *bougainvillea fauroensis* ssp. n., ♂ (holotype); 31, *castanea* Kevan, ♀ (holotype); 32, *alata* sp. n., ♂ (holotype). Fig. 33—36. *Bumacris* (s.str.) species. 33, *flavomaculata* C. Willemse, ♂ (E. of Kwalo); 34, *bougainvillea* Ramme, ♂ (Kokure); 35, *rendovae* sp. n., ♂ (holotype); 36, *pagdeni pagdeni* C. Willemse, ♂ (Vella Lavella, M. McQuillan)

Fig. 37—45. *Bumacris* (s.str.) species. 37, *pagdeni kolombangarae* ssp. n., ♂ (paratype, Iriri); 38, *pagdeni mundae* ssp. n., ♂ (paratype); 39, *leveri* Uvarov, ♂ (topotype); 40, *monotona* C. Willemse, ♂ (Kiwi Creek); 41, *pagdeni pagdeni* C. Willemse, ♂ (Kundurambangara); 42, *pagdeni mundae* ssp. n., ♀ (allotype); 43, *pagdeni kolombangarae* ssp. n., ♀ (allotype); 44, *flavomaculata* C. Willemse, ♀ (Dala); 45, *bougainvillea* Ramme, ♀ (Guaka). Fig. 46—47, *Bumacris* (*Cristovalacris*) *venosa* subgen. & sp. n. 46, ♂ (holotype); 47, ♀ (Bweinaniawarikiapu)

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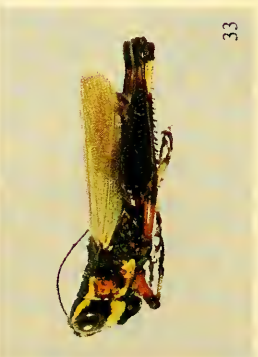
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INHOUD

C. VAN ACHTERBERG. — A revision of the tribus Blacini (Hymenoptera, Braconidae, Helconinae), pp. 159-322, Fig. 1-476.

Tijdschrift voor Entomologie, deel 118, afl. 7 Gepubliceerd 30-3-1976

A REVISION OF THE TRIBUS BLACINI (HYMENOPTERA, BRACONIDAE, HELCONINAE)

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Abstract

The tribus Blacini (Braconidae, Helconinae) is revised with special reference to the non-Palaearctic species. The tribus is almost cosmopolitan and embraces the genera *Blacus* Nees, *Blacozona* gen. nov. from Argentina, from Chile *Stegnocella* gen. nov. and *Apoblacus* gen. nov., and *Artocrus* gen. nov. from Brazil. For the first time a subgeneric division of *Blacus* is given; five new subgenera are proposed. All species of *Blacus* are keyed, 34 new species are described and fully illustrated. The phylogenetic relationships between the subgenera are discussed. A redescription of *Mirax cremastobombyciae* (Fullaway, 1956) comb. nov., is added.

Contents

Introduction 160
Terminology 160
Distribution 166
Fossil species 169
Phylogeny 169
Biology 172
Key to the tribus of the Helconinae 173
Tribus Blacini 174
Key to genera and subgenera of the Blacini 174
Genus *Blacozona* nov. 176
Genus *Stegnocella* nov. 177
Genus *Blacus* Nees 179
Subgenus *Mesoxiphium* nov. 179
Subgenus *Leioblacus* nov. 180
Subgenus *Ischnotron* nov. 183
Subgenus *Tarpheion* nov. 185
Subgenus *Contochorus* nov. 195
Subgenus *Ganychorus* Haliday 196
Subgenus *Hysterobolus* Viereck 215
Subgenus *Blacus* Nees 221
Subgenus *Neoblacus* Ashmead 243
Genus *Apoblacus* nov. 245
Genus *Artocrus* nov. 247
Excluded species 248
Species inquirendae 250
Acknowledgements 251
Literature 252
Index of names used in the Blacini 320

INTRODUCTION

A critical study of the Blacini was needed for a long time. Up to 1973, it was not possible to identify with certainty even most Palaearctic species. As pointed out by Muesebeck (1951: 109) "the Nearctic representatives of this subfamily [= Blacinae] are mostly undescribed", and there was much to investigate before the taxonomy of this group could be used in an unambiguous way. Without doubt several species still have to be described, especially from the Oriental, Ethiopian and Neotropical regions. In 1900, 22 valid species had been described, in 1970 only five were added, while at present, mainly through the efforts of Haeselbarth, 59 valid species are known. The present paper brings the total number of *Blacus* species to 93.

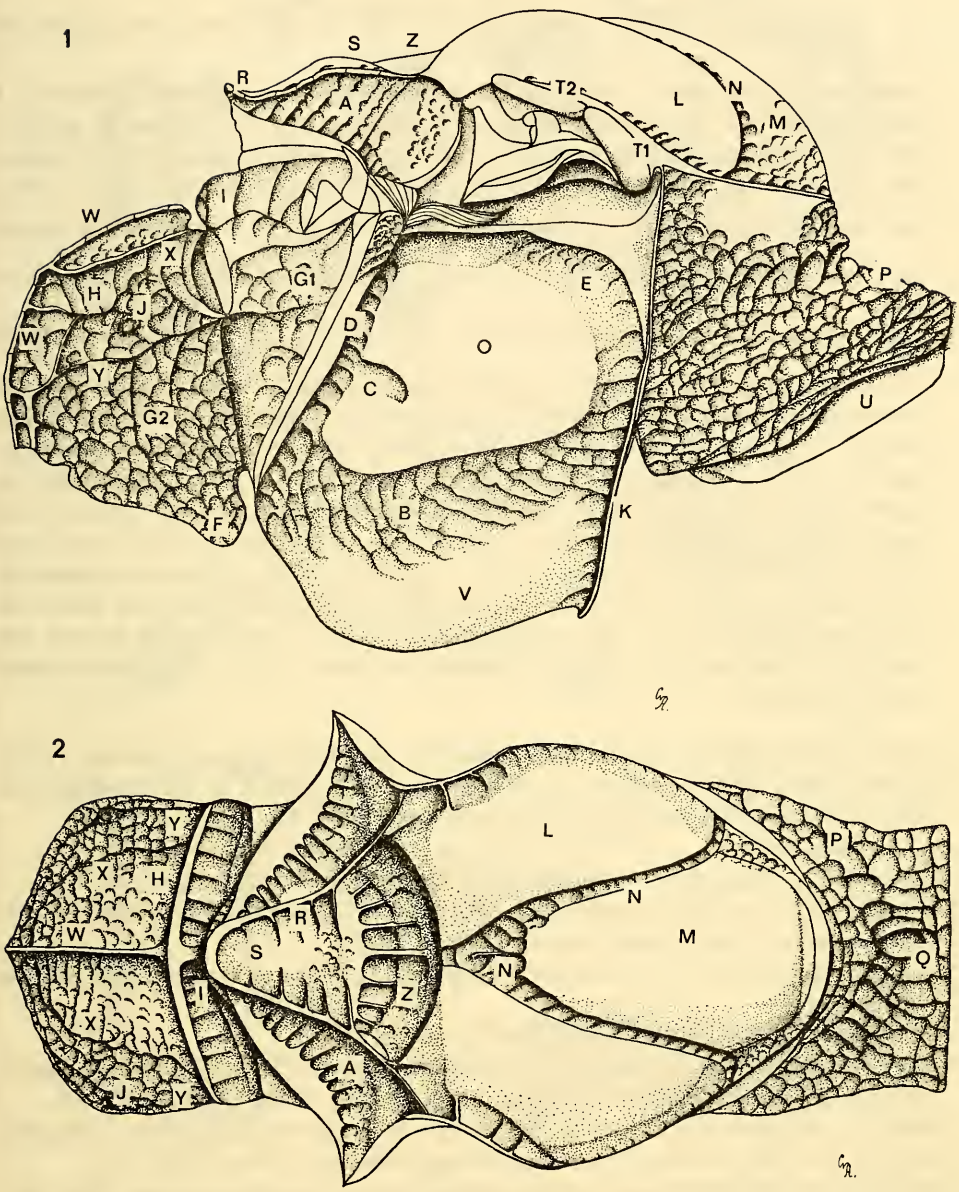
The present revision of the tribus started as a revision of *Hysterobolus* Viereck, which proved to be at the most a subgenus of *Blacus* Nees. Subsequently the scope was widened, ultimately embracing the whole genus. The need for a revision of the Palaearctic species was large, but after the excellent revision by Haeselbarth (1973a), I could concentrate mainly on the species from other regions. Because the specimens are small and the differences tend to be minute, the descriptions have to be furnished with many figures. Therefore, I decided to illustrate all species treated here in a comparable way. Because of the differences in the way the specimens had been mounted I was often forced to prepare my figures under different angles. Especially when comparing the frontal aspects of the head, the student has to be aware of possible artificial differences as a result of this.

No keys are given for the males because of the lack of reared series of *Blacus* outside the Palaearctic region. They are often difficult to assign to the right females, especially in the subgenera *Blacus* and *Hysterobolus*. Through comparison with the figures given and keeping in mind that males have larger eyes, a shorter malar space and the first metasomal tergite more slender, it will be possible to identify the males at least up to the species-group. Because Shenefelt (1969) gives an excellent list of pertinent literature, only the original publications, Shenefelt's catalogue and the literature published after 1969 are cited.

According to Čapek's research I consider the Blacini a divergent tribe of the Helconinae. Although Tobias (1965: 859) recognized the generalized structure of the genitalia in *Blacus*, he placed it together with such highly specialized genera as *Pygostolus*, *Allurus* and *Centistes* (which may form a separate tribus Centistini, in the Perilitinae (= Euphorinae auct. p.p.)). The probably convergent reduction of the wing venation and some uncertain data about the biology of *Blacus* are insufficient. It also is unlikely that *Blacus* would be a parasite of mature Coleoptera, because of its fragile ovipositor. The cephalic structures of the final instar larvae are different from the Euphorinae as pointed out by Čapek (1973: 261). The Blacini have distinct teeth on their mandibles, while the Euphorinae possess smooth, toothless mandibles.

TERMINOLOGY

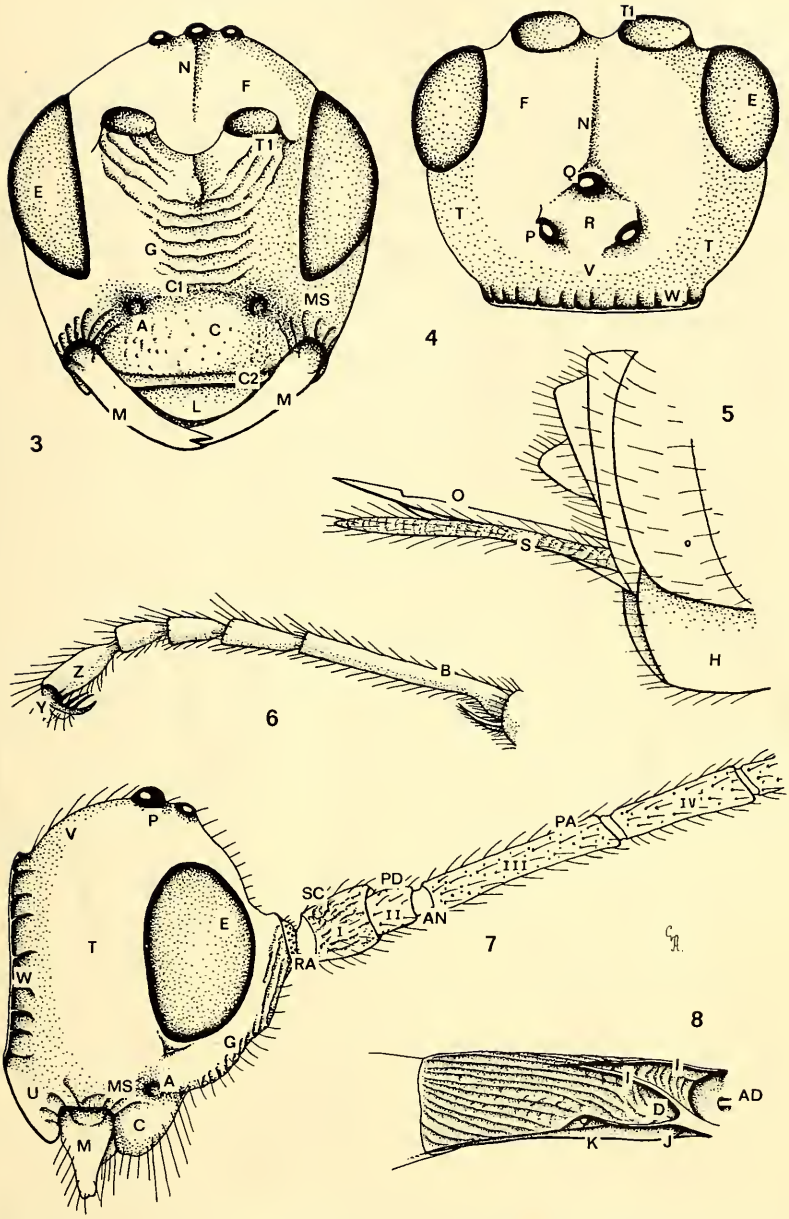
Richards (1956) is largely followed; for the wing venation, I have used the Jurinean system (Fig. 15, 16) after Fischer (1972: 40) and Marsh (1962: 523; 1971: 843) but with some additions. For the other terms used see Fig. 1—9 and 12—19, to which the following explanation may be added.



Figs. 1—2, mesosoma of *Blacus* (*Ganychorus*) *pallipes* Haliday, ♀, Netherlands, Wijster, 5—8.vii. 1974, legs and wings removed. 1, lateral aspect; 2, dorsal aspect. *A* = side of scutellum or axilla; *B* = precoxal suture; *C* = episternal scrobe; *D* = pleural suture; *E* = epicnemial suture; *F* = metapleural flange; *G1* = anterior part of metapleuron; *G2* = posterior part of metapleuron; *H* = propodeum; *I* = metanotum; *J* = propodeal spiracle; *K* = prepectal carina; *L* = lateral lobe of mesoscutum; *M* = middle lobe of mesoscutum; *N* = notauli; *O* = mesopleuron; *P* = pronotum; *Q* = pronope; *R* = lateral carina of scutellum; *S* = scutellum; *T1* + *T2* = tegulae; *U* = prosternum; *V* = mesosternum; *W* = medial carina of propodeum; *X* = lateral carina of propodeum; *Y* = pleural carina; *Z* = scutellar suture. 75 ×

A.C.I.: Apomorphous Character Index; $\frac{\sum_{x=1}^{n} a \times 100}{n}$ in which "*n*" is the number of characters used, while *a* is a value for the presence of an apomorphous character in a group, as given for the Blacini in Table 2. Always present (+) is given the value 1, both apomorphous and plesiomorphous conditions occurring frequently (±) counts for 1/2, when the apomorphous condition is absent (—), it has the value 0. Intermediary conditions between the first and the second $\left(\begin{smallmatrix}+\\(-)\end{smallmatrix}\right)$ and between the second and last mentioned $\left(\begin{smallmatrix}(+)\\-\end{smallmatrix}\right)$ count for 3/4 and 1/4, respectively. For instance, in *Tarpheion, a* totals up to 7.25, thus its A.C.I. is $\frac{7.25 \times 100}{26} = 27.8$. The maximum value is computed by taking all apomorphous characters (except for the ones in brackets) and neglecting the possible plesiomorphous conditions in the group. For instance, *Tarpheion* theoretically may have species with 9 apomorphous characters, and its $A.C.I._{max}$ is 900 : 26 = 34.6. The reverse is the $A.C.I._{min}$, with only the apomorphous characters counted of which no plesiomorphous condition occurs in the group (those in brackets excluded). The $A.C.I._{min}$ of *Tarpheion* is 500 : 26 = 19.2 (only 5 of such apomorphous characters are present). When a group is represented by one species, only one A.C.I. is possible. Theoretically one species may have such an extraordinary variation that more than one value is possible, but I have not encountered such species. The values computed are given in Fig. 20. See also remarks under phylogeny (p. 167).

Diplope: distinct laterope and dorsope at about the same height (Van Achterberg, 1974).
Dorsope: antero-dorsal depression of 1st metasomal tergite, more or less pit-shaped, in *Blacus* between dorsal carina and dorso-lateral carina (Fig. 8).
Eye: compound eye.
Frontal suture: usually shallow suture in front of anterior ocellus (Fig. 3, 4).
Glymma: linear depression between dorso-lateral carina and ventro-lateral carina (Fig. 8).
Height: maximum height unless otherwise stated.
Inclivous: transverse vein of which the anterior end is nearer to the wing base than its posterior end.
ITL: distance between both anterior tentorial pits (Fig. 9).
Laterope: antero-basal depression of 1st metasomal tergite, more or less pit-shaped, between dorso-lateral and ventro-lateral carina, situated in the glymma (Fig. 8).
Length of 3rd antennal segment: for convenience the length of the annellus is included.
Length of fore wing: measured from apex of tegulae to apex of wing (Fig. 15).
Length of 1st metasomal tergite: measured from anterior muscle to its apex (Fig. 14).
Length of ovipositor sheath: linear length of visible part (Fig. 17).
Malar suture: suture (usually shallow) between under edge of eye and base of mandible (Fig. 26).
Mesosoma: thorax of most authors, but in the Apocrita it also comprises the addition of the 1st abdominal segment or propodeum (or epinotum in Formicidae) to the thorax. Following Michener (1944), the part of the body between the 1st and 2nd strong constriction is called mesosoma.
Metasoma: Following Michener (1944), it is defined as the part of the body after



Figs. 3—8, *Blacus* (*Ganychorus*) *pallipes* Haliday, same specimen as in Fig. 1. 3, frontal aspect of head; 4, dorsal aspect of head; 5, apex of metasoma, lateral aspect; 6, fore tarsus, lateral aspect; 7, lateral aspect of head; 8, 1st metasomal tergiet, dorso-lateral aspect. *A* = anterior tentorial pit; *B* = basitarsus; *C* = clypeus; *C1* = hypostomal suture; *C2* = clypeal margin; *D* = dorsope; *E* = eye; *F* = frons; *G* = face; *H* = hypopygium; *I* = dorsal carinae; *J* = laterope; *K* = glymma; *L* = labrum; *M* = mandible; *N* = frontal suture; *O* = ovipositor; *P* = posterior ocellus; *Q* = anterior ocellus; *R* = stemmaticum; *S* = ovipositor sheath; *T* = temple; *T1* = antennal socket; *U* = occipital flange; *V* = vertex; W = occipital carina; *X* = spiracle of 1st metasomal tergite; *Y* = claw; *Z* = telotarsus; *AD* = anterior muscle or adductor of 1st metasomal tergite; *AN* = annellus; *MS* = malar space; *PA* = postannellus or 3rd antennal segment; *PD* = pedicellus or 2nd antennal segment; *RA* = radix; *SC* = scapus or 1st antennal segment. 64 ×

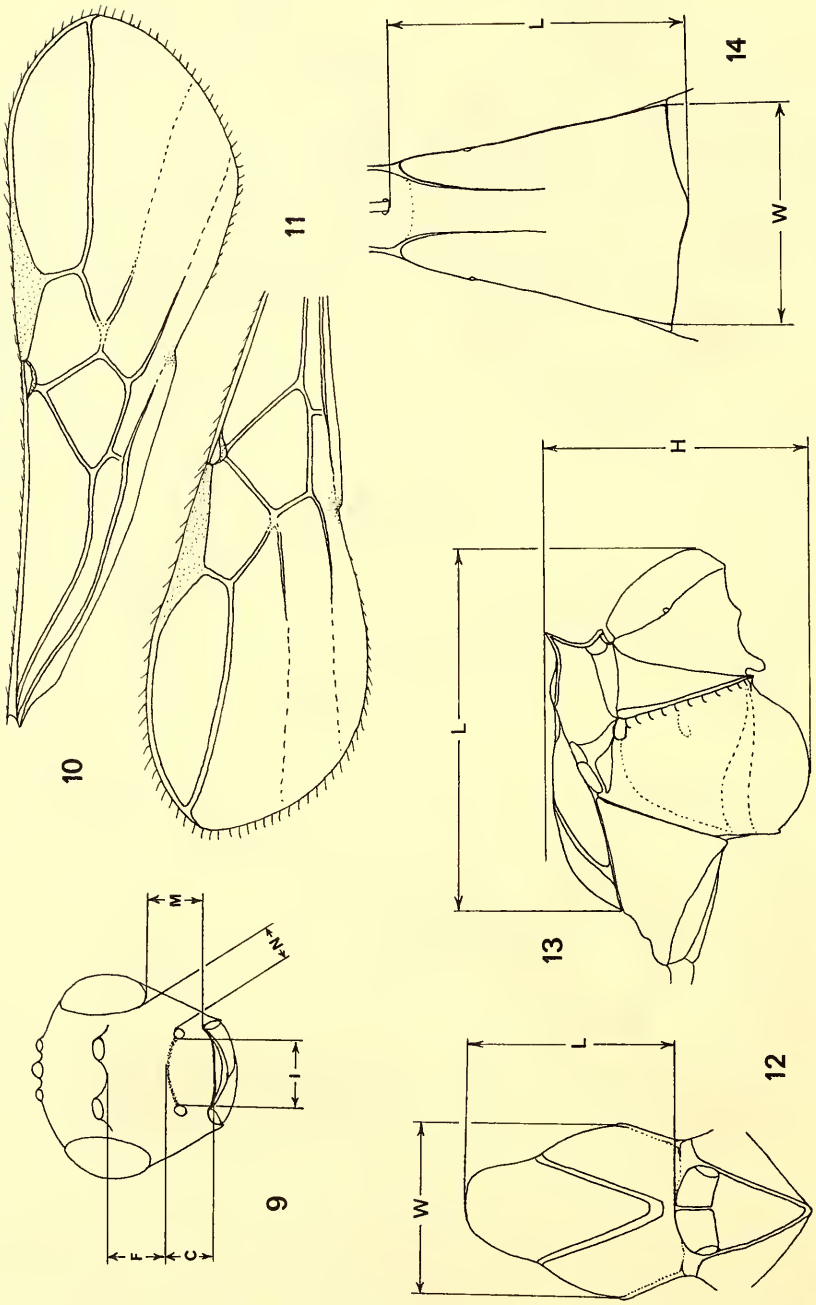
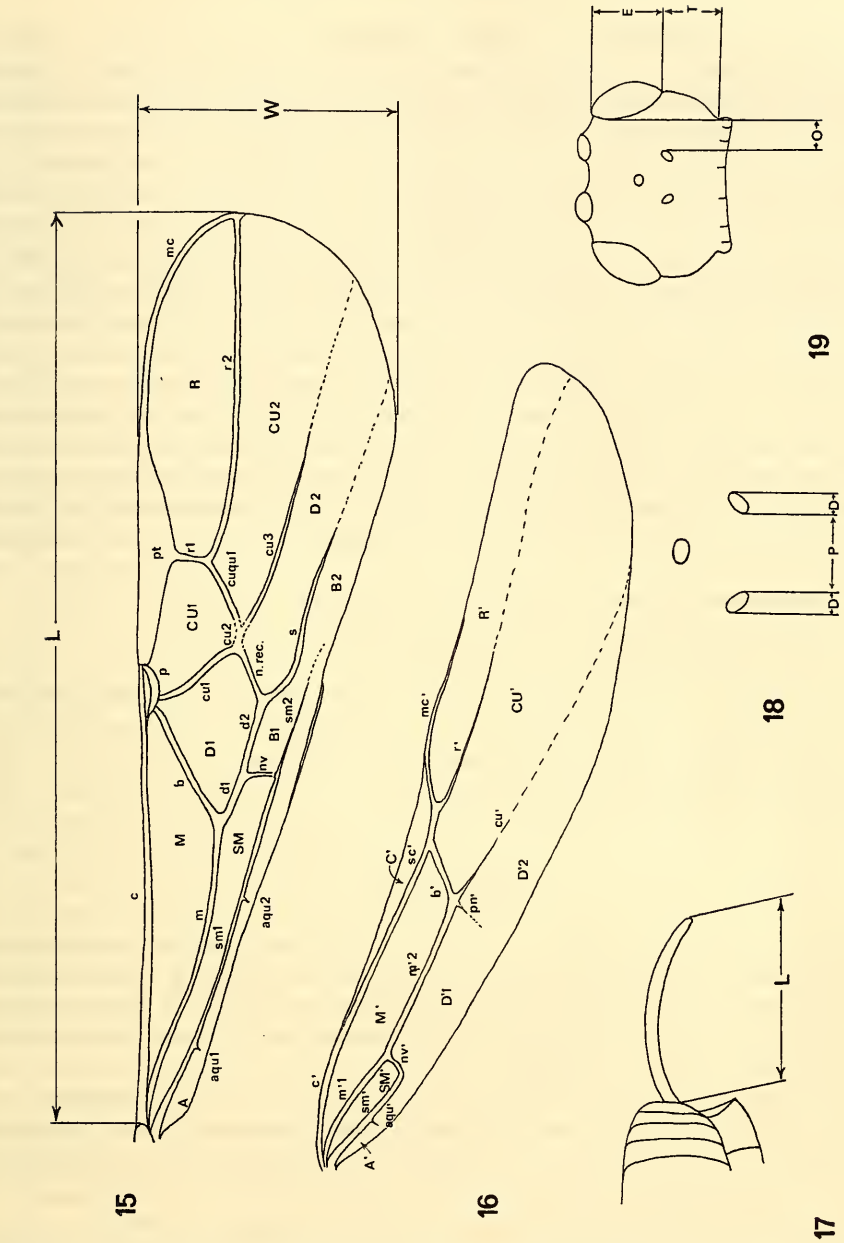


Fig. 9—19. 9, frontal aspect of head; 10, right fore wing of *Blacus* (*Ganychorus*) *genalis* Haeselbarth, ♀, v.8055, Stam Coll.; 11, left fore wing of same specimen; 12, mesonotum, dorsal aspect; 13, mesosoma, lateral aspect; 14, 1st metasomal tergite, dorsal aspect; 15, fore wing; 16; hind wing; 17, apex of metasoma, lateral aspect; 18, stemmaticum; 19, dorsal aspect of head. *E* = dorsal length of eye; *T* = dorsal length of temple; *F* = length of face; *CL* = length of clypeus; *D* = diameter of posterior ocellus; *H* = height; *I* = inter-tentorial line; *L* = length; *MS* = malar space; *N* = tentorio-ocular line; *O* = ocular-ocellar line; *P* = postocellar line. Fore wing, veins: *aqu 1*, *aqu 2* = 1st and 2nd transverse anal vein; *b* = basalis; *c* = costa + subcosta; *cu1*, *cu2*, *cu3* =



1st, 2nd and 3rd abscissa of cubitus; *cuqu1* = 1st transverse cubital vein; *d1*, *d2* = 1st and 2nd abscissa of discoideus; *m* = media; *mc* = metacarp; *nv* = nervulus; *n. rec.* = nervus recurrens; *p* = parastigma; *pt* = pterostigma; *r1*, *r2* = 1st and 2nd abscissa of radius; *s* = subdiscoideus; *sm1*, *sm2* = 1st and 2nd abscissa of submedius. Cells of fore wing: *A* = anal cell; *B1* = 1st brachial cell; *B2* = 2nd brachial cell; *CU1* = 1st cubital cell; *CU2* = 2nd cubital cell; *D1* = 1st discoidal cell; *D2* = 2nd discoidal cell; *M* = medial cell; *R* = radial cell; *SM* = submedial cell. Hind wing, veins: *b'* = basella; *c'* = costella; *cu'* = cubitella; *m'1*, *m'2* = 1st and 2nd abscissa of mediella; *mc'* = metacarpella; *nv'* = nervellus; *pn'* = postnervellus; *r'* = radiella; *sc'* = subcostella; *sm'* = submediella; *aqu'* = transverse anallan vein. Cells of hind wing: *A'* = anallan cell; *C'* = costallan cell; *CU'* = cubitellan cell; *D'1* = 1st discoidellan cell; *D'2* = 2nd discoidellan cell; *M'* = mediellan cell; *R'* = radiellan cell; *SM'* = submediellan cell

the 2nd strong constriction, usually called the abdomen or gaster. Its anterior segments may form a petiolus or petiolar segment (or scales in the Formicidae). Richards (1956: 39) proposes the term "gaster"; another possibility is to count the real abdominal segments. The physical 1st segment of the metasoma has to be called the 2nd tergite; for practical reasons and for uniformity this possibility is abandonned. Unfortunately the term gaster is differently applied, e.g. Nixon (1942: 184) and Graham (1969: 11) use it for the 3rd-9th abdominal segments. This may be correct in respect to its meaning, gaster being Greek for stomach or belly; the whole 2nd abdominal tergite (or 1st metasomal) is called "(gastral) petiole". More common is its use for the 2nd-9th abdominal tergites as proposed by Richards, e.g. Griffiths (1964: 830) and Eady (1969: 165). The use of the term abdomen for the real 2nd-9th tergites is confusing, e.g. Nixon (1938: 415; 1943: 259), Papp (1965: 181), Starý (1966: 22), Fischer (e.g. 1970: 254) and Haeselbarth (1973a: 72); a well-defined term, such as metasoma is preferable. To make it even more confusing, in the Myrmicinae the gaster comprises the 4th-9th abdominal segments. It is clear that gaster and abdomen are used in a functional way and not in a correct, homologous way. So I prefer as univalent name for the 2nd-9th abdominal segments, the term metasoma as defined above.

OOL: distance between posterior ocellus and eye (Fig. 19).

Pronope: name proposed for the medio-dorsal pit of pronotum (Fig. 2).

POL: distance between both posterior ocelli (Fig. 18).

Reclivous: transverse vein of which the anterior end is farther from the wing base than its posterior end.

TOL: distance between anterior antennal pits and eye (Fig. 9).

Width: maximum width, unless otherwise stated.

Ø: diameter.

DISTRIBUTION

As shown in Table 1, the Blacini are almost cosmopolitan; only from the Australian and Pacific regions I could not examine any specimens. The genus *Blacus* is known from the Holarctic region for a long time, but the first species from the Ethiopian region was only described in 1949, while from the Neotropical and Oriental regions they are described for the first time in this paper.

Some subgenera of *Blacus* have an almost completely Holarctic distribution (viz., *Neoblacus, Blacus, Hysterobolus* and *Leioblacus*); some are very wide-spread (*Ganychorus* and *Tarpheion*) and others occur in one region only (*Mesoxiphium* and *Contochorus*).

Table 1. Numbers of species per region for the different genera in the Blacini

Region \ Genus	*Blacus*	*Blacozona*	*Artocrus*	*Stegnocella*	*Apoblacus*
Palaearctic	37	—	—	—	—
Nearctic	19	—	—	—	—
Holarctic	10	—	—	—	—
Neotropical	8	1	1	1	1
New World	1	—	—	—	—
Ethiopian	16	—	—	—	—
Oriental	2	—	—	—	—

Fossil species

The examined fossil species will be treated in a second paper. Brues placed five species in *Blacus* and two in *Neoblacus*, but at least partially they belong to the Brachistini.

Phylogeny

In constructing the classification for the Blacini I have tried to follow the principles of phylogenetic systematics as defined by Hennig (1966). The terms apomorphous and plesiomorphous are used to indicate the degree of divergence of (in this case morphological) characters from an ancestral state in respect to each other.

The Apomorphous Character Index is tentatively used to indicate the divergence from the ancestral state in a numerical taxonomic way. Such characters cannot simply be added up, but for an indication of the divergence of a group as a whole and its variation, it can be a useful tool. It is used in the same way in some papers in phylogenetic systematics in which mention is made of apomorphous and plesiomorphous groups rather than of apomorphous and plesiomorphous character states. The selection of the characters may be a subjective factor, which can be diminished by taking a large number of characters.

I consider the tribus Blacini to be a monophyletic group which possesses the following apomorphous characters: 1 — absence of cuqu 1; 2 — absence of aqu 1 + 2, or faint remnants visible at the most (e.g. Fig. 24); 3 — 1st discoidal cell sessile, seldom (sub)petiolate; 4 — brachial cell open, only closed in *Blacozona* and *Stegnocella*; 5 — subbasal dorsope; 6 — dorsal surface of propodeum as long as apical surface or longer. The synapomorphous characters 1—3 it shares with its sister-group Brachistini. Of these the tribus Blacini possesses the most apomorphous characters. The most important characters of the (sub-)genera are given in a note at the end of the description. The genera *Blacozona* from Argentina and *Stegnocella* from Chile form the less derived group and may have a great resemblance to the stem-species of the subtribus. Later Neotropical descendants are the genera *Apoblacus* and *Artocrus*, and the subgenera *Leioblacus* and *Mesoxiphium*.

Judging from the shape and carination of the propodeum, *Mesoxiphium*, *Leioblacus*, *Ischnotron* and *Tarpheion* are a less derived group than the related subgenera *Contochorus*, *Ganychorus* and *Hysterobolus* (Fig. 21). As to the other characters there may be a different situation, as illustrated by the A.C.I. given in Fig. 20. A large subgenus as *Ganychorus* is variable and may embrace species with few apomorphous characters (comparable with the less derived groups) and with many apomorphous characters, approaching a derived subgenus as *Contochorus*.

Interesting is the convergent development in the *Blacus*-line (*Blacus* + *Neoblacus*) and in the *Ganychorus*-line (*Ganychorus* + *Hysterobolus*). Both have the medial area of the posterior surface of the propodeum indistinct or absent; only in *Ganychorus* it may seldom occur, indicating the relationship with *Tarpheion*: a group evolved primarily in the Southern Hemisphere. This situation is reached in different ways: in the *Ganychorus*-line by uniting the branches of the medial area, usually resulting in a distinct medial carina which is sometimes secondarily indistinct by surrounding sculpture. In the *Blacus*-line both branches are less developed and not well visible by the reticulation of the posterior surface of the propodeum. *Ganychorus* probably evolved primarily in the Southern Hemisphere and *Blacus* evolved in the Northern Hemisphere. *Hysterobolus*

Table 2. Presence or absence of apomorphous characters in genera and subgenera of the Blacini. (For discussion, see p. 162).

Apomorphous state of character (= +)	Blacozona	Stegnocella	Mesoxiphium	Leioblacus	Ischnotron	Tarpheion	Contochorus	Ganychorus	Hysterobolus	Artocrus	Blacus	Apoblacus	Neoblacus	Plesiomorphous state of character (= —)
cu 1 from parastigma	+	+	+	+	+	+	+	±	+	—	+	—	+	cu 1 from basalis
ovipositor short	+	—	—	±	+	+	+	+	+	+	±	+	+	ovipositor long
lateral carina of scutellum complete	—	—	—	+	+	+ (—)	+	+	+	—	(+) —	—	(+) —	lateral carina of scutellum incomplete or absent
antennal segments of ♀ 18 or less	—	—	+	+	+	(+) —	+	±	±	—	+	?	+	antennal segments of ♀ more than 18
2nd tergite of metasoma smooth	+	—	+	+	±	(+) —	+	+ (—)	+	+	+ (—)	+	—	2nd tergite sculptured
malar suture absent	—	+	+	+	—	—	—	±	±	+	±	+	+	malar suture present
r 1 longer than width of pterostigma	—	—	—	+	—	±	+	±	±	—	±	—	—	r 1 shorter than width of pterostigma
subdiscoideus almost straight	—	—	—	±	±	—	+	+ (—)	—	—	±	—	+	subdiscoideus distinctly bent
medial carina of propodeum undivided	—	+	—	—	—	—	—	±	+	+	+ (—)	+	+	medial carina of propodeum divided
scutellum sculptured	—	—	—	—	—	±	—	±	+	—	±	—	+	scutellum smooth
fore claw of ♀ with blackish bristles	—	—	—	—	—	±	+	+	+ (—)	+	—	+	—	fore claw of ♀ simple, without bristles

middle claw of ♀ with blackish bristles	—	—	—	—	—	—	+	±	—	+	—	+	—	middle claw of ♀ simple
propodeal tubercles present	+	—	—	—	—	—	—	±	+	—	±	+	+	propodeal tubercles absent
notauli absent dorsally	—	—	—	±	±	—	—	—	—	—	±	+	±	notauli complete
eyes setose	—	—	—	—	—	—	+	±	+	—	(+) —	—	—	eyes bare
parastigma enlarged in respect to c + sc	—	—	—	—	—	—	—	±	—	—	±	—	—	parastigma in respect to c + sc medium-sized
metasoma strongly compressed	—	—	—	+	+	—	+	—	—	—	—	—	—	metasoma at least in anterior half depressed
ovipositor bent ventrad	—	—	—	—	±	+	—	—	—	—	±	—	—	ovipositor straight
hypopygium relatively large	+	+	—	—	—	+	—	—	—	—	(+) —	—	—	hypopygium small to medium-sized
metapleural flange absent	—	—	+	+	—	—	—	—	—	—	—	—	—	metapleural flange present
dorsal surface of propodeum much longer than its posterior surface	—	+	—	—	—	—	+	—	—	+	—	+	—	dorsal surface of propodeum almost equal to posterior surface
nervellus absent	—	—	—	±	—	—	—	—	—	—	—	—	—	nervellus present
scutellar suture smooth	—	—	—	+	—	—	—	—	—	—	—	—	—	scutellar suture crenulate
scutellum with spine	—	—	—	—	—	—	—	—	—	+	—	—	—	scutellum without spine
cu 1 + 2 absent	—	—	—	—	—	—	—	—	—	—	—	—	+	cu 1 + 2 present
occipital carina reduced	—	—	—	—	+	±	—	—	—	—	—	—	—	occipital carina complete

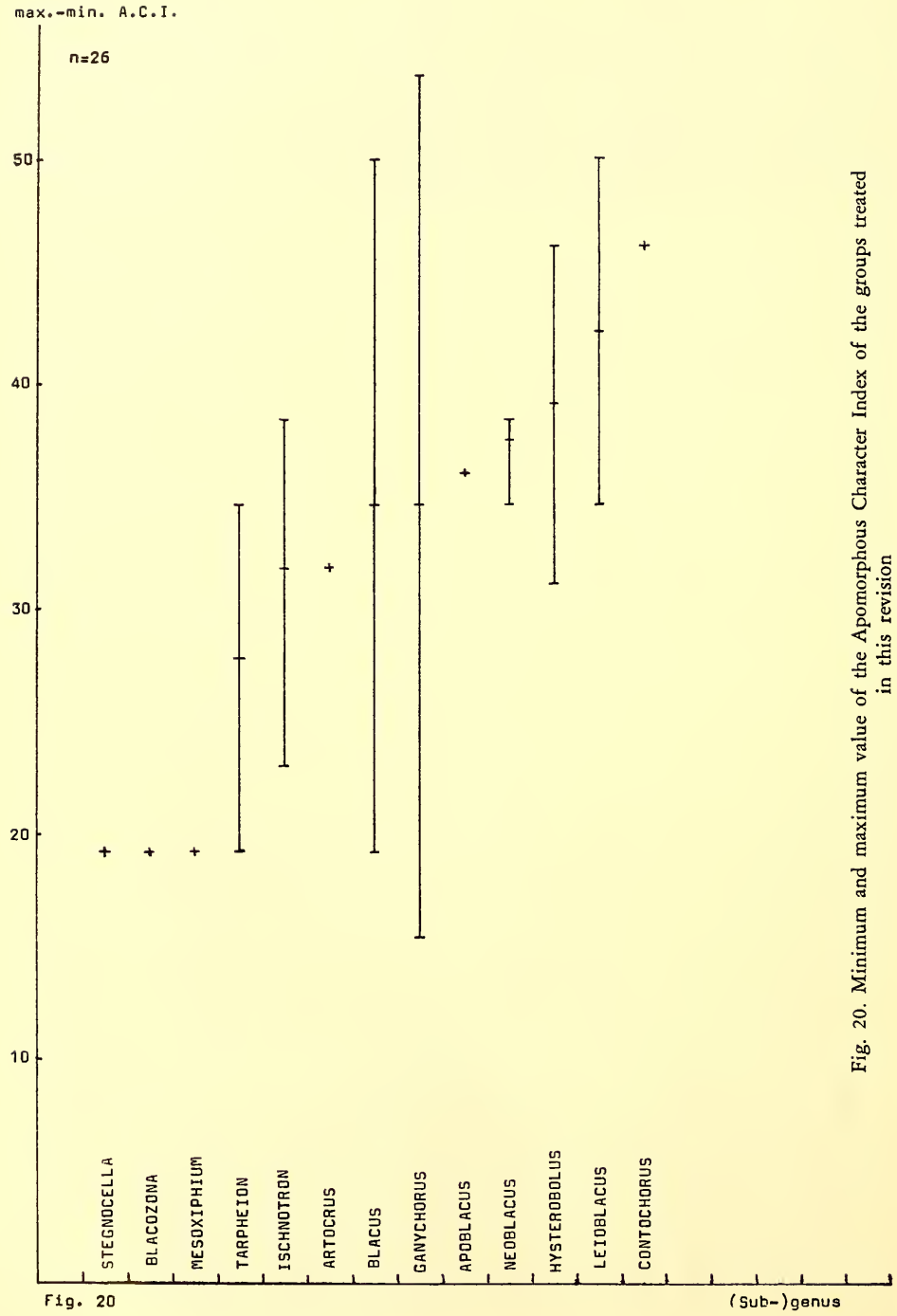


Fig. 20. Minimum and maximum value of the Apomorphous Character Index of the groups treated in this revision

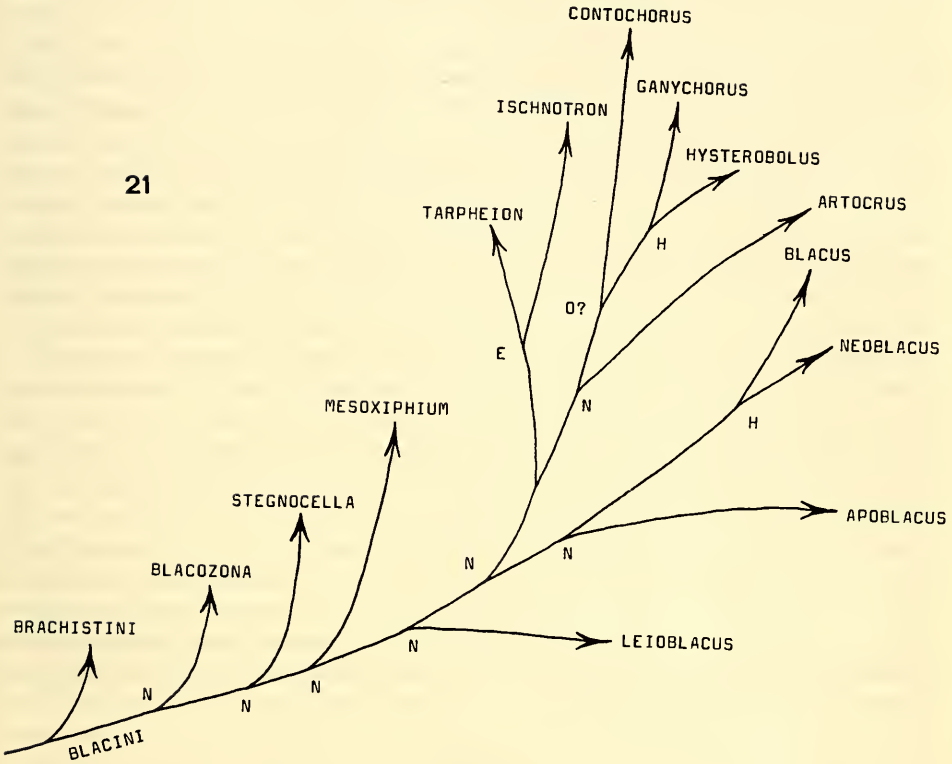


Fig. 21. Dendrogram of possible relationship in the Blacini. The zoogeographic regions in which the primary radiation may have taken place are indicated by the following abbreviations: *H* = Holarctic; *N* = Neotropical; *E* = Ethiopian; *O* = Oriental. The Australian region is excluded, its fauna being too imperfectly known

(from *Ganychorus*) and *Neoblacus* (from *Blacus*) evolved secondarily in the Holarctic region.

Where a primary radiation may have taken place can be deduced from the occurrence of related groups and their variation, their present distributions, and the kind of variability in other regions, if other regions are occupied. Because of insufficient collecting in the tropics only provisional conclusions can be drawn. As stated above, the primary evolution of *Ganychorus* most likely took place in the Neotropical region. A secondary fast evolution or radiation has taken place in the Palaearctic region; mainly in the *diversicornis*-group of *Blacus* (*Ganychorus*) (*maculipes* Wesmael, *ambulans* Haliday, *koenigsmanni* Haeselbarth and *kaszabi* Haeselbarth) and in the *ruficornis*-group (*nitidus* Haeselbarth, *conformis* Wesmael, *pectinatus* Haeselbarth, *capeki* Haeselbarth and *apaches* spec. nov.). *B.*(*G.*) *ruficornis* (Nees) is a Holarctic species; in the Nearctic region I could not detect such a secondary radiation, only *ruficornis* is somewhat more polymorphous than in the Palaearctic region. In the Ethiopian region both groups are represented by closely related species, viz., *haeselbarthi* spec. nov. and *dracomontanus* Haeselbarth, respectively, which seem to have derived from the large Palaearctic radiation.

Independently, micropterous forms have evolved in the *Ganychorus*-line and in the *Blacus*-line. The micropterous forms have a neotenic development of one character, the wings; this phenomenon is called paedomorphosis retardation by Hennig (1966: Fig. 67).

The relative positions of *Neoblacus*, *Contochorus*, etc. as subgenera are at first sight rather subjective, but I have tried to split a group only if distinct combinations of apomorphous characters are present. If this is not the case, or the combination is rather diffuse in respect to other groups, at most subgeneric rank is given. Also it is too simple to split a group on the presence or the absence of one particular character only, e.g. the absence of cu 1 in *Neoblacus*. A combination of several apomorphous characters is needed in constructing a satisfactory taxonomic system. Often one out of a certain number of apomorphous characters occurs not in the apomorphous state; but by the presence of the majority of the others such species can be placed satisfactorily.

BIOLOGY

Hosts of Blacini are almost unknown, except for some Palaearctic species (Haeselbarth, 1973a: 78). As Čapek (1970: 853) stated for the whole subfamily Helconinae, the records indicate that most species are endoparasites of larvae of Coleoptera. Some host-beetles live in mushrooms (viz., of *Blacus* (*Ischnotron*) *gracilis* Haeselbarth, of *B.* (*Blacus*) *hastatus* Haliday (probably on beetle larvae infesting tree-mushrooms such as *Polyporus*), of *B.* (*B.*) *humilis* (Nees) (on *Cryptophagus lycoperdi* Hbst., but also bred from *Myelophilus piniperda* L. and, probably, from *Stegobium paniceum* L.)).

Some other host beetles live in or under bark (viz., of *B.* (*B*) *humilis*, of *B.* (*B.*) *longipennis* (Gravenhorst) (from *Anobium* species), of *B.* (*B.*) *exilis* (Nees) (from *Ips vorontzowi* Jacobs and from *Magdalis armigera* Geoffr.), of *B.* (*Neoblacus*) *koenigi* Fischer (from *Scolytus koenigi* Sam.) and of *B.* (*B.*) *errans* (Nees) (from a *Dasytes* species).

Some species seem to parasitize small Staphylinidae: *B.* (*Ganychorus*) *ruficornis* (Nees) (reared from *Tachyporus obtusus* L.) and *B.* (*Blacus*) *exilis* (a large series was found together with many Staphylinidae in a mouldy grass heap). Some species were reared from nests of shrews (*B.* (*Ganychorus*) *armatulus* Ruthe) or bumble-bees (*B.*

(*Blacus*) *paganus* Haliday, *B.* (*B.*) *maryi* f. *nidicola* Hedqvist and *B.* (*B.*) *masoni* spec. nov. These may be places for hibernation, but they may as well parasitize small Coleoptera infesting such nests, e.g. *B.* (*B.*) *paganus* (Haliday) is reported as a parasite of *Antherophagus* spec. (Cryptophagidae) in surface and underground nests of bumblebees (Alvord, 1975: 134), while *B.* (*B.*) *filicornis* Haeselbarth was bred from a bird's nest.

But there are several other hosts: *B.* (*Blacus*) *nigricornis* Haeselbarth is a parasite of *Meligethes* species, *B.* (*B.*) *instabilis* Ruthe is frequently found in buildings, especially where food is present (possible hosts are several small Coleoptera, e.g. *Stegobium paniceum*, *Cryptophagus* and *Carpophilus* species, Ptinidae and Staphylinidae). Other species may be parasites of larvae of small Diptera and Coleoptera living in plant tissue. This may represent a secondary development in the Helconinae; it occurs in *B.* (*Blacus*) *interstitialis* Ruthe (from *Oscinella frit* (Chloropidae)) and in *B.* (*B.*) *exilis* (from *Contarinia medicaginis* K. (Cecidomyidae)). The only host record from the Nearctic region (a male of *B.* (*Ganychorus*) *ruficornis* ex *Coleophora laricella* (Hbn.) (Lepidoptera, Coleophoridae) is almost certainly erratic.

The wide spectrum of hosts in some species may explain the large variation in these species and some others as *B.* (*Blacus*) *exilis*, *B.* (*B.*) *humilis* and *B.* (*Ganychorus*) *ruficornis*. Many species seem to be univoltine in the Holarctic region, exceptions may be *B.* (*B.*) *diversicornis* (Nees), *B.* (*B.*) *humilis*, *B.* (*B.*) *exilis* and *B.* (*B.*) *instabilis*. The hibernation of the ♀ is known (or likely) in *B.* (*Ganychorus*) *pallipes* Haliday, *B.* (*G.*) *tripudians* Haliday, *B.* (*G.*) *ruficornis*, *B.* (*G.*) *ambulans* Haliday, *B.* (*G.*) *maculipes* Wesmael, *B.* (*G.*) *diversicornis*, *B.* (*G.*) *striatus* spec. nov., *B.* (*G.*) *armatulus*, *B.* (*Hysterobolus*) *mamillanus* Ruthe, *B.* (*Blacus*) *instabilis*, *B.* (*B.*) *filicornis*, and *B.* (*B.*) *exilis*.

Very peculiar for Hymenoptera is the forming of swarms by males of *B.* (*Ganychorus*) *ruficornis*, *B.* (*G.*) *tripudians*, *B.* (*G.*) *maculipes*, *B.* (*G.*) *nigricornis* and in the *B.* (*Blacus*) *exilis*-group, as pointed out by Haeselbarth (1973a: 77—78). This behaviour can be explained by the, in Helconinae more observed, individual dancing of the males in the neighbourhood of emerging females, combined with a high density of the species. When a female approaches the dancing males, some males leave the group and try to copulate with her. The enlargement of the parastigma of the male in some species seems to be related to the dancing behaviour of these species.

Key to the tribus of Helconinae

1. Metasoma inserted dorsally on propodeum, far above hind coxae . . Cenocoeliini
— Metasoma inserted ventrally, between hind coxae 2
2. cuqu 2 present; frons more or less excavated behind antennal sockets . . Helconini
— cuqu 2 absent; frons slightly or not excavated, often weakly convex 3
3. Dorsope of 1st metasomal tergite absent, if present then narrow and shallow, situated near spiracles; 1st brachial cell almost always closed at apex; usually larger species with antennal segments of ♀ usually more than 22 . . . . . Brachistini
— Dorsope of 1st tergite distinct, usually large and deep, situated basally from the spiracles; 1st brachial cell open at apex, only in the new genera *Blacozona* and *Stegnocella* closed; usually small species with antennal segments in ♀ 15—21, seldom more . . . . . Blacini

Tribus Blacini

Diagnosis. — Length of body 1.3—4.5, length of fore wing 1.5—4.5 mm; antennal segments of ♀ 14—32, usually 17—21; palpi medium-sized, slender (but wide in *Apoblacus*), maxillary palpus usually about as long as height of head, with 6 segments, labial palpus about half length of maxillary palpus, with 3 segments; face and clypeus usually distinctly convex; margin of clypeus usually straight medially, seldom somewhat concave; anterior tentorial pits distinct, deep, medium-sized; usually occipital carina complete but in *Ischnotron* absent and in *Tarpheion* sometimes absent dorsally; lateral carina of scutellum present or absent, sometimes protruding apically, only in *Artocrus* with distinct spine; prepectal carina complete; precoxal suture usually present; metapleural flange present, except in *Leioblacus* and *Mesoxiphium*; length of dorsal surface of propodeum about equal to length of its posterior surface except in *Contochorus, Stegnocella, Apoblacus,* and *Artocrus,* in which the dorsal surface is distinctly longer, and in *Blacozona* where the dorsal surface is somewhat longer than the posterior surface; notauli usually present; d 1 : d 2 = 1 : 0.7—15.0; 1st brachial cell open apically, except in *Blacozona* and *Stegnocella*; only remnants of aqu 1 + 2 present or completely absent; length of hind femur 3.5—8.0 times its width; claws of ♀ simple, but with blackish bristles in *Ganychorus, Artocrus, Hysterobolus* and some species of *Tarpheion*; claws of ♂ always simple; dorsope of 1st metasomal tergite usually large and deep[1]), in front of spiracles; laterope medium-sized or small and shallow; length of ovipositor sheath 0.07—0.88 times fore wing, usually 0.14—0.46 times, seldon longer or shorter.

Key to the genera and subgenera of the Blacini

1. First brachial cell closed at apex (Fig. 24, 464); claws of ♀ simple; antennal segments of ♀ 32 (Fig. 29, 461) 2
— First brachial cell open at apex (Fig. 74), sometimes narrowly (Fig. 33); claws of ♀ variable; antennal segments of ♀ 14—27 3
2. Metacarp surpasses the radial cell (Fig. 464); 3rd antennal segment 1.2 times 4th segment (Fig. 461); precoxal suture absent, except for a shallow depression (Fig. 461); ovipositor distinctly longer than fore wing; 2nd tergite of metasoma weakly sculptured basally (Fig. 468); epistomal suture complete (Fig. 465) . . . . . *Stegnocella* gen. nov. (p. 177)
— Metacarp ends near apex of the radial cell (Fig. 24); 3rd antennal segment 0.8 times 4th segment (Fig. 22); precoxal suture coarsely punctate (Fig. 22); ovipositor much shorter than fore wing; 2nd tergite smooth; epistomal suture absent medially (Fig. 26) . . . . . *Blacozona* gen. nov. (p. 176)
3. Metasoma completely enclosed by the 2nd and following tergites (Fig. 469), sternites invisible and ventral side of metasoma equally sclerotized as its dorsal side; submedial cell strongly widened apicad (Fig. 475); ovipositor sheath 0.07 times fore wing (Fig. 469) . . . . . *Apoblacus* gen. nov. (p. 245)
— Metasoma not completely enclosed by its tergites (Fig. 390), sternites are visible and ventral side of metasoma less sclerotized than its dorsal side; submedial cell less

[1]) Dorsope very large and deep, almost meeting each other in combination with deep laterope; medial carina of propodeum absent and with a medio-dorsal pentagonal area, cf. Euphorinae-Centistini.

widened apicad (Fig. 442); ovipositor sheath 0.15—0.88 times fore wing (Fig. 352) 4

4. Scutellum with large spine (Fig. 293); lateral carina of scutellum in basal half only (Fig. 298); fore and middle claws of ♀ with blackish bristles and teeth (Fig. 296) . . . . . *Artocrus* gen. nov. (p. 247)

— Scutellum without spine, sometimes lateral carina of scutellum protruding apically (Fig. 213); claws simple or with teeth and bristles . . . . . (= *Blacus* Nees s.l.) 5

5. cu 1 (and 2) absent (Fig. 450); tarsal claws simple . . . . . *Neoblacus* Ashmead (p. 243)

— cu 1 (and usually 2) present (Fig. 442); tarsal claws simple or with bristles and teeth 6

6. Occipital carina completely absent; medial carina of propodeum divided apically (Fig. 63), forming a narrow medial area . . . *Ischnotron* subgen. nov. (p. 183)

— Occipital carina present, at least laterally; medial carina undivided, or divided, then usually medial area wider dorsally (Fig. 86) 7

7. Propodeal carinae less developed (Fig. 333, 341, 351) and lateral carina of scutellum absent (Fig. 349) or weakly developed (Fig. 385, 388); posterior division of medial carina of propodeum indistinct or absent (Fig. 333, 341); antennal segments of ♀ 17; fore claw of ♀ simple or bristles indistinct, yellowish; nervellus from middle of mediella or from distal (Fig. 300, 378, 422), seldom from more basal (Fig. 439) . . . . . *Blacus* Nees (p. 221)

— Propodeal carina (Fig. 113, 161) and usually lateral carina of scutellum (Fig. 160) distinctly developed; medial carina divided posteriorly (Fig. 86) or undivided (Fig. 161, 205); antennal segments of ♀ seldom 17 (Fig. 46, 51, 134); fore claw of ♀ with blackish bristles or simple; nervellus usually basal to middle of mediella, seldom from more distal (Fig. 33, 151, 158) 8

8. Medial carina of propodeum divided posteriorly, resulting in 3 posterior areas (Fig. 86, 94), of which the medial area usually is wider, at least dorsally and comparable in length to length dorsal surface of propodeum or longer; if posterior surface of propodeum is strongly reticulate, then 2nd tergite of metasoma striate; middle claw of ♀ always simple 11

— Medial carina undivided posteriorly, medio-posteriorly propodeum usually covered with reticulate sculpture and areas indistinct (Fig. 161, 255); if medial carina is distinctly divided then medial area rectangular and distinctly shorter than dorsal surface of propodeum (Fig. 136) or medial area narrow (Fig. 155) and middle claw of ♀ with distinct blackish bristles; 2nd metasomal tergite completely smooth or nearly so 9

9. Propodeal tubercle large (Fig. 249, 255) and scutellum reticulate (Fig. 261) . . . . . *Hysterobolus* Viereck (p. 215)

— Propodeal tubercle absent or small (Fig. 141), if large then scutellum smooth 10

10. Medial carina of propodeum divided posteriorly, medial area rectangular, smooth, and length of posterior surface much shorter than dorsal surface of propodeum (Fig. 136); antennal segments of ♀ 17 and propodeal tubercles absent . . . . . *Contochorus* subgen. nov. (p. 195)

— Medial carina of propodeum undivided, or if indistinctly divided, medial area cellulate

and usually scarcely discernable from surrounding reticulation (Fig. 155, 161), length of dorsal surface of propodeum about equal to posterior surface (Fig. 155); antennal segments of ♀ 15 or 19—25 if propodeal tubercle is absent . . . . . *Ganychorus* Haliday (p. 196)

11. Metapleural flange distinct; hypopygium large (Fig. 72); malar suture present (Fig. 78); 2nd metasomal tergite often sculptured; ovipositor sheath usually shorter and bent ventrad (Fig. 72, 120, 127) . . . . *Tarpheion* subgen. nov. (p. 185)
— Metapleural flange indistinct, at most carina somewhat protruding; hypopygium small; malar space without groove; 2nd metasomal tergite smooth; ovipositor sheath usually long and slightly bent only (Fig. 30, 46) 12
12. Scutellar suture smooth or longitudinal carina indistinct; metasoma compressed (Fig. 37, 53); lateral carina of scutellum present apically (Fig. 48); antenna stout, not or indistinctly dilated apically (Fig. 46) . . . *Leioblacus* subgen. nov. (p. 180)
— Scutellar suture with distinct medial carina; metasoma not compressed; lateral carina of scutellum absent apically (Fig. 36); antenna slender, distinctly dilating apically (Fig. 30) . . . . . *Mesoxiphium* subgen. nov. (p. 179)

Blacozona gen. nov.
(Fig. 22—29)

Etymology: from "blax", Greek for dull because of the dull 1st metasomal tergite; it also is a combination of the generic names *Blacus* and *Eubazus* to indicate the intermediate position of the new genus. Gender, feminine.

Type-species: *Blacozona psichora* spec. nov.

Diagnosis. — Antenna relatively many-segmented, tapering apicad, 3rd segment shorter than 4th segment; eye bare; occipital carina complete; epistomal suture absent medially; malar suture deep and distinct; genal flange distinctly developed; pronope deep, medium-sized; precoxal suture complete; pleural suture relatively narrow; metapleural flange small, sharp; notauli completely developed; lateral carina of scutellum completely absent; dorsal surface of propodeum somewhat longer than its posterior surface, dorsally a medial carina and posteriorly a rather narrow area is indicated (Fig. 23); propodeal tubercle small; metacarp not surpassing radial cell; branchial cell closed; nervellus relatively long; small remnants of aqu 1 + 2 present; all tarsal claws simple; length of hind femur 4.1 times its width; length of 1st metasomal tergite 1.2 times its apical width; glymma wide anteriorly; laterope rather deep and large; dorsope large; 2nd tergite smooth; ovipositor straight, length of its sheath 0.27 times fore wing; hypopygium large.

Distribution. — Neotropical: one species.

Blacozona psichora spec. nov. (Fig. 22—29)

Holotype, ♀, length of body and fore wing both 3.5 mm.

Head. — Antennal segments incomplete (32 in ♀-paratype (Fig. 29), apical segment composed, distinctly tapering apicad), length of 3rd segment 0.8 times 4th segment, length of 3rd and 4th segments 2.6 and 3.2 times their width, respectively, penultimate segments wider than long; maxillar palpus slender, somewhat longer than height of head; dorsal length of eye 1.4 times temple; temple and vertex finely punctulate; POL: Ø

ocellus : OOL = 16 : 9 : 20; frontal suture absent; frons concave above antennal sockets; occipital carina distinctly developed, area in front of it almost smooth in dorsal half, crenulate ventrad; face and clypeus somewhat convex, finely punctulate; anterior tentorial pits deep (Fig. 26); apical margin of clypeus slightly sinuate, thin; mandible sculptured basally; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.5 times its height; side of pronotum with large, distinctly separated punctures (Fig. 22); zone behind prepectal carina crenulate; epicnemial suture, precoxal suture and side of scutellum coarsely punctate; pleural suture rather shallowly crenulate; episternal scrobe distinct; metapleura punctato-reticulate as propodeum; notauli rather widely punctato-crenulate, distinctly widening apicad; mesoscutal lobes flattened, superficially punctulate; scutellar suture wide, moderately deep, with four rather weakly developed longitudinal carinae, punctato-rugose laterally; scutellum moderately convex, superficially punctulate; propodeal tubercle weakly developed, consisting of somewhat protruding carinae.

Wings. — First discoidal cell subpetiolate, rather sharp anteriorly; r 2 slightly bent; d 1 : d 2 = 3 : 16; parastigma rather large.

Legs. — Hind coxa rugose dorsally, femur and tibia of hind leg punctate; tarsal claws rather wide basally, slender apically; length of femur, tibia and basitarsus of hind leg 4.1, 7.9 and 7.0 times their width, respectively.

Metasoma. — Length of 1st tergite 1.2 times its apical width, spiracles slightly protruding, surface almost completely punctato-reticulate (Fig. 23), dorsal carinae distinct in basal two-fifths; length of ovipositor sheath 0.27 times fore wing; whole metasoma rather closely setose.

Colour. — Blackish brown; scapus, pedicellus, pronotum, and tegulae, reddish; coxae, fore and middle legs largely, whitish yellow; hind femur dorsally, hind tibia and basitarsus largely, 2nd and 3rd metasomal tergites and pterostigma, dark brownish; wings somewhat infuscated.

Holotype ♀ in MCZ, Cambridge (USA): "Villa Nougues, Tucuman, Argent., xi.26/28-[19]64, 1250 m, C. Porter". Paratype: 1 ♀, topotypic, xii.-5/8-[19]64 (AC).

Note. This genus, together with *Stegnocella*, forms the group with the largest number of plesiomorphous characters in the Blacini. But the apomorphous condition of propodeum and 1st tergite makes its connections with the Blacini clear, despite its resemblance to the Brachistini. The apomorphous characters are: 1 — dorsal surface of propodeum longer than posterior surface (Fig. 22); 2 — dorsope distinctly developed; 3 — side of pronotum punctate; 4 — ovipositor sheath relatively short; 5 — hypopygium large; 6 — 3rd antennal segment shorter than 4th segment; 7 — small propodeal tubercle present; 8 — pleural suture reduced; 9 — epistomal suture obliterated.

The plesiomorphous characters are: 1 — lateral carina of scutellum absent; 2 — number of antennal segments large; 3 — remnants of aqu 1 + 2; 4 — submediellan cell large, nervellus long; 5 — 1st brachial cell closed apically; 6 — frons concave; 7 — mandible sculptured; 8 — s + sc relatively wide and composed (Fig. 24).

Stegnocella gen. nov.
(Fig. 461—468)

Etymology: from "stegnus" (Latin for closed) and "cella" (Latin for cell) because of the closed 1st brachial cell. Gender, feminine.

Type-species: *Stegnocella calyptoides* spec. nov.

Diagnosis. — Antenna many-segmented, tapering apicad, 3rd segment longer than 4th segment; eye bare; occipital carina and epistomal suture complete; malar suture absent; occipital flange distinctly developed; pronope deep with a deep short furrow at both sides; precoxal suture absent except for a smooth depression (Fig. 461); pleural suture medium-sized; metapleural flange large and blunt; notauli completely developed; lateral carina of scutellum only present in anterior third (Fig. 466); dorsal surface of propodeum somewhat longer than posterior surface (Fig. 461, 468) and without carinae; its posterior surface with 2 submedial carinae; propodeal tubercle absent; metacarp surpasses distinctly the radial cell (Fig. 464); brachial cell closed; nervellus comparatively long; remnants of aqu 1 + 2 and of aqu′ are present; all tarsal claws simple; length of hind femur 5.0 times its width; length of 1st metasomal tergite 2.1 times its apical width; glymma medium-sized; laterope rather deep, medium-sized; dorsope rather large; basal half of 2nd tergite superficially sculptured (Fig. 468); ovipositor almost straight, length of its sheath 1.38 times fore wing; hypopygium large.

Distribution. — Neotropical: one species.

Stegnocella calyptoides spec. nov. (Fig. 461—468)

Holotype, ♀, length of body 1.9, of fore wing 1.8 mm.

Head. — Antennal segments 32, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segment 3.2 and 2.6 times their width, respectively, penultimate segments quadrate; maxillary palpus slender, about as long as height of head; dorsal length of eye 1.1 times temple; temple and vertex smooth; POL : Ø ocellus : OOL = 11 : 6 : 11; frontal suture absent; frons almost flat; occipital carina distinctly developed, area in front of it smooth; face and clypeus moderately convex, smooth; antennal tentorial pits deep (Fig. 465); apical margin of clypeus wide, straight and thin; mandibles smooth; length of malar space about 1.6 times the basal width of mandible.

Mesosoma. — Length of mesosoma 1.6 times its height; side of pronotum reticulato-rugose anteriorly and almost smooth posteriorly; zone behind prepectal carina smooth; epicnemial suture, precoxal suture and side of scutellum smooth; pleural suture medium-sized, distinctly crenulate; episternal scrobe medium-sized; metapleura coarsely punctate; notauli rather deep and narrow, only crenulate in anterior half; mesoscutal lobes moderately convex, smooth; scutellar suture wide, rather shallow, with one distinctly developed longitudinal carina; scutellum smooth, convex; propodeal tubercle absent but with a rather deep depression above the base of the hind coxa (Fig. 461); dorsal surface of propodeum transversely reticulato-punctate (but indistinctly developed anteriorly), its posterior surface smooth except for both carinae (Fig. 468).

Wings. — First discoidal cell sharp anteriorly; r 2 almost straight; d 1 : d 2 = 4 : 14; parastigma medium-sized.

Legs. — Hind coxa smooth except for two short striae anteriorly; femur and tibia of hind leg almost smooth; tarsal claws rather wide basally, slender apically; length of femur, tibia and basitarsus 5.0, 7.8 and 7.5 times their width, respectively.

Metasoma. — Length of 1st tergite 2.1 times its apical width, its surface rugoso-reticulate medially and almost smooth laterally (Fig. 468), spiracles distinctly protruding, dorsal carinae distinct in anterior third; length of ovipositor sheath 1.38 times fore wing; tergites with setae more or less in submedial rows; hypopygium truncate apically.

Colour. — Dark brown; antenna generally, palpi, antennal sockets, mandibles, tegulae and legs, yellowish; pronotum, reddish.

Holotype in CNC, Ottawa: "Termas Tolhuaca, Malleco, Chile, 15-20.i.1959, L.E. Peña", "very primitive genus, mp = 6, lp = 3, anellan + 2 anals, new genus ?Blacini, det. W. R. M. Mason 74".

Notes. The resemblance to *Charmon* (Zelinae) may be mainly convergential, while the greater resemblance to the subgenus *Calyptus* of *Eubazus* (Brachistini) may indicate the relationship between the sister-tribes Blacini and Brachistini. But a male from El Coigo (Curico, Chile, i-ii.1961, L. E. Peña, CNC) has no metapleural flange, pronope indistinct and anallan vein more distinctly developed, as in *Charmon*. *Charmon* is distinguished by the absence of dorsal carinae and dorsope and by the inclivous nervulus, while *Calyptus* has no dorsope or if weakly indicated, then near the spiracles; dorsal surface of propodeum about as long as posterior surface and 1st brachial cell almost always open apically.

The apomorphous characters of *Stegnocella* are: 1 — dorsal surface of propodeum without distinct carinae and longer than its posterior surface (Fig. 468); 2 — dorsope distinctly developed; 3 — hypopygium large; 4 — setae of metasoma mainly arranged in rows dorsally; 5 — malar suture absent; 6 — epicnemial and precoxal sutures smooth; 7 — mandibles smooth.

The plesiomorphous characters are: 1 — lateral carina of scutellum scarcely developed; 2 — number of antennal segments large; 3 — remnants of aqu 1 (and less distinctly of) aqu 2 and aqu′ present; 4 — submediellan cell and nervellus relatively long; 5 — brachial cell closed; 6 — division between s and sc present (Fig. 464); 7 — metacarp surpasses the radial cell; 8 — metapleural flange large; 9 — posterior surface of propodeum weakly differentiated from dorsal surface; 10 — ovipositor long; 11 — 2nd tergite of metasoma sculptured; 12 — margin of clypeus wide and thin; 13 — occipital carina completely and strongly developed.

Blacus Nees
Mesoxiphium subgen. nov.
(Fig. 30—36)

Etymology: from "mesos" (Greek for middle) and "xiphos" (Greek for sword) because of the long ovipositor which gives the species an appearance intermediate between Blacini and Brachistini; gender, neuter.

Type-species: *Blacus monostigmaticus* spec. nov.

Diagnosis. — Antennal segments restricted in number, dilated apicad (Fig. 30); palpi medium-sized; eye bare; occipital carina complete and medium-sized; frons and vertex smooth; clypeus punctate, its apical margin straight, malar suture absent; precoxal suture shallow, almost absent; pleural suture narrow, indistinctly crenulate; metapleural flange absent, but carinae somewhat protruding; notauli complete but shallow; scutellar suture deep, with one longitudinal carina; scutellum smooth, its lateral carina absent in apical 0.4; 1st discoidal cell sharp anteriorly; parastigma indistinct; brachial cell rather narrowly open apically; all tarsal claws simple, slender; length of hind femur 5.8 times its width; dorsal surface of propodeum with medial and both lateral carinae weakly developed, on posterior surface carinae more distinct, forming three areas (Fig. 35); propodeal tubercle absent; 1st metasomal tergite medium-sized (Fig. 35), rather flat, dorsope large; 2nd tergite smooth; ovipositor long, its sheath about 3/4 length of fore wing, somewhat bent ventrad apically (Fig. 30); hypopygium small.

Distribution. — Neotropical: one species.

B. (Mesoxiphium) monostigmaticus spec. nov. (Fig. 30—36)

Holotype, ♀, length of body 2.4, length of fore wing 2.5 mm.

Head. — Antennal segments 14, dilating apicad, length of 3rd segment 1.1 times 4th segment, length of 3rd and 4th segments 9.5 and 9.0 times their width, respectively, scapus smooth, length of penultimate segments ca. twice their width; maxillary palpus slightly longer than height of head; dorsal length of eye 1.2 times temple; POL : Ø ocellus : OOL = 5 : 2 : 4; frontal suture absent; stemmaticum slightly protruding; area in front of occipital carina almost smooth; face rather convex, nearly smooth; anterior antennal pits rather large; clypeus moderately convex; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.6 times its height; sides of pronotum reticulato-rugose, except for antero-dorsal area (Fig. 30); side of middle lobe of mesoscutum about smooth; zone behind prepectal carina almost smooth; epicnemial suture smooth; precoxal suture shallowly depressed, almost smooth (Fig. 30); pleural suture indistinctly and sparsely crenulate; episternal scrobe medium-sized, rather deep; metapleura rugoso-reticulate; notauli rather shallow, superficially crenulate; mesoscutal lobes moderately convex; scutellar suture wide and long; scutellum rather convex, its lateral carina present in anterior three-fifths only; side of scutellum rugose; dorsal surface of propodeum coriaceous with medial and both lateral carinae weakly developed, three posterior areas distinct (Fig. 35).

Wings. — r 2 almost straight; d 1 : d 2 = 1 : 5.

Legs. — Hind coxa rugose dorsally; femur and tibia of hind leg almost smooth; length of femur, tibia and basitarsus of hind leg 5.8, 12.3 and 7.0 times their width, respectively.

Metasoma. — Length of 1st tergite 1.8 times its apical width, rather flat, densely reticulato-rugose (Fig. 35), dorsal carinae distinct in basal fifth, its spiracle protruding; length of ovipositor sheath 0.78 times fore wing.

Colour. — Reddish brown; pedicellus, annellus, mouth parts, coxae, trochanters, femora, bases of tibiae and pterostigma, yellowish.

Holotype ♀ in CNC, Ottawa: "Antillanca, Osorno, Chile, 18.iii.1955, 1000 m, L.E. Peña", "*Blacus* ? or *Dyscoletes*, det. W. R. M. Mason 72".

Note. Resembles the Palaearctic *Eubazus flavipes*, but the latter is distinguished by shape of 1st metasomal tergite, shorter dorsal surface of propodeum, different number and shape of antennal segments. Important apomorphous characters are: 1 — antenna few-segmented, dilated apicad; 2 — precoxal suture shallow, nearly absent; 3 — pleural suture narrow and indistinctly crenulate; 4 — metapleural flange absent; 5 — lateral carina of scutellum in anterior 0.4 present; 6 — parastigma indistinctly developed; 7 — 2nd metasomal tergite smooth.

Leioblacus subgen. nov.
(Fig. 37, 38, 40, 41, 46—57)

Etymology: from "leios" (Greek for smooth) and *Blacus*, because of smooth scutellar suture; gender, masculine.

Type-species: *Blacus compressiventris* spec. nov.

Diagnosis. — Length of body 1.8—2.2, length of fore wing 1.9—2.5 mm; antennal segments of ♀ 17 or 18, of ♂ 15—16; eye bare; occipital carina complete; frons and

vertex smooth; frontal suture absent; clypeus smooth or nearly so; face smooth; length of malar space about equal to basal width of mandible; malar suture absent, but an indistinct depression may be present; side of pronotum largely smooth; epicnemial suture smooth; precoxal suture absent or reduced to a medial crenulate depression (Fig. 46); metapleural flange absent, except for somewhat protruding carina; notauli largely absent or complete; scutellar suture wide or subquadrate, smooth, without longitudinal carinae; scutellum smooth, its lateral carina completely developed, not protruding apically; side of scutellum smooth or superficially rugose; parastigma small; 1st discoidal cell sharp or narrowly truncate anteriorly; d 1 : d 2 = 1 : 2.9—3.3; metacarp somewhat surpassing radial cell (Fig. 47); length of hind femur 5.5—6.8 times its width; hind coxa smooth; all claws of ♀ simple; propodeal tubercle absent; propodeal carinae distinctly developed, apically with slender medial area formed by division of medial carina; sides of 1st metasomal tergite about parallel; 2nd tergite of metasoma smooth; ovipositor straight; length of ovipositor sheath 0.31—0.70 times fore wing; metasoma after 1st tergite smooth, strongly compressed, even in examined males; hypopygium small.

Distribution. — Palaearctic: one species; Nearctic: one species.

Note. Important apomorphous characters are: 1 — antenna few-segmented; 2 — precoxal suture absent or medially developed only; 3 — metapleural flange absent; 4 — scutellar suture smooth; 5 — lateral carina of scutellum complete; 6 — parastigma small or indistinctly developed; 7 — metasoma strongly compressed; 8 — 2nd metasomal tergites smooth; 9 — notauli and nervellus more or less reduced.

Key to species of the subgenus *Leioblacus*

1. Notauli complete, deep (Fig. 48); length of ovipositor sheath 0.31 times fore wing; precoxal suture present medially (Fig. 46); r2 bent (Fig. 47); nervellus absent (Fig. 47) . . . . . *aulacis* spec. nov. (p. 181)
— Notauli absent posteriorly (Fig. 54) or weakly indicated (Fig. 55); length of ovipositor sheath 0.53—0.70 times fore wing; precoxal suture absent (Fig. 51); r2 straight (Fig. 51); nervellus present (Fig. 51) 2
2. Mesoscutum smooth, usually notauli even basally absent (Fig. 54); hind femur somewhat more slender (Fig. 56); 1st metasomal tergite yellowish, remaining of metasoma brownish, contrasting . . . . . *compressiventris* spec. nov. (p. 182)
— Mesoscutum with notauli weakly indicated (Fig. 55); hind femur somewhat less slender (Fig. 41); 1st metasomal tergite brownish as remainder of metasoma, not contrasting . . . . . *fischeri* Haeselbarth (p. 183)

Blacus (Leioblacus) aulacis spec. nov. (Fig. 37, 38, 46—50)

Holotype, ♀, length of body 1.8, length of fore wing 1.9 mm.

Head. — Antennal segments 17 (but apical segment consisting of two fused segments), length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.0 and 3.0 times their width, respectively, penultimate segments somewhat longer than wide; dorsal length of eye 0.8 times temple (Fig. 50); POL : Ø ocellus : OOL = 7 : 3 : 8; area in front of occipital carina indistinctly crenulate, almost smooth; face unevenly convex; apical margin of clypeus straight medially (Fig. 38).

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum smooth, except for some rugae; zone behind prepectal carina finely crenulate; precoxal suture

reduced to median depression with some carinae (Fig. 46); notauli complete, distinctly developed, superficially crenulate; mesoscutal lobes flattened dorsally; scutellar suture subquadrate (Fig. 48); surface of propodeum smooth or with some microsculpture between carinae.

Wings. — First discoidal cell narrowly truncate anteriorly; r2 evenly bent; d 1 : d 2 = 7 : 20; nervellus absent; nervulus indistinct (Fig. 47).

Legs. — Length of femur, tibia and basitarsus of hind leg 5.5, 11.5 and 8.0 times their width, respectively.

Metasoma. — Length of 1st tergite 2.8 times its apical width, surface smooth, except for some carinae, dorsal carinae complete (Fig. 37), spiracle flat; length of ovipositor sheath 0.31 times fore wing.

Colour. — Dark brown; scapus, pedicellus, mandible, palpi, coxae, trochanters, femora, tibiae, tarsi and metasoma basally, more or less yellowish.

Holotype ♀ in CNC, Ottawa: "Mex. Dgo. 3 mi. E. El Salto, 8500 [ft], 10 July 1964, W. R. M. Mason".

Blacus (Leioblacus) compressiventris spec. nov. (Fig. 51—54, 56, 57)

Holotype, ♀, length of body 2.1, length of fore wing 2.2 mm.

Head. — Antennal segments 18 (paratypes: 8 have 18, 1 has 17 and 1 has right 18 and left 17), bases of 3rd-8th segments hyaline, length of 3rd segment equal to 4th segment, length of 3rd and 4th segments 3.0 times their width, penultimate segments slightly longer than wide, antenna slightly widened apicad; dorsal length of eye 0.8 times temple (Fig. 57); POL : Ø ocellus : OOL = 9 : 6 : 14; area in front of occipital carina smooth; face almost flat; apical margin of clypeus weakly concave medially (Fig. 52).

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum sparsely rugose, largely smooth (Fig. 51); zone behind prepectal carina smooth; precoxal suture absent; notauli absent, except for smooth depression anteriorly (Fig. 51); mesoscutum somewhat unevenly convex; scutellar suture wide (Fig. 54); surface of propodeum almost smooth.

Wings. — First discoidal cell sharp anteriorly (but variable in paratypes, sometimes in right wing sharp and in left wing truncate); r2 straight; d 1 : d 2 = 3 : 10; nervellus and nervulus distinct (Fig. 51).

Legs. — Length of femur, tibia and basitarsus of hind leg 6.8, 11.1 and 8.0 times their width, respectively.

Metasoma. — Length of 1st tergite 2.5 (paratypes: 1.8—2.5) times its apical width, surface smooth, except for some rugulosity, shiny, dorsal carinae almost reach apex, spiracle protruding (Fig. 53); length of ovipositor sheath 0.53 times fore wing (in paratypes up to 0.70 times).

Colour. — Dark brown; mandible, labrum, palpi, base of antenna, legs (usually except hind tibia and femur) and 1st metasomal tergite, yellowish; pterostigma, light brown; hind tibia apically more brownish (in paratypes hind femur apically often darkened).

Holotype ♀ in CNC, Ottawa: "Old Chelsea, Que., 20.ix.1961, J. R. Vockeroth". Paratypes (22) from type-locality, Ontario (Innisville, Chatterton, Marmora area, at latter locality collected in "moist fungus-rich wooded creek bed"); British Columbia (Terrace, Hixon); North Carolina (Wayah Gap nr. Franklin, Highlands (at light));

Georgia (Holcomb Creek, Pine Mnt., Warwoman Creek); New Hampshire (Lakes of the Clouds, 5000 ft., Mt. Washington); South Carolina (Anderson) (CNC, AC).

Blacus (Leioblacus) fischeri Haeselbarth (Fig. 40, 41, 55)

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 122—123, Fig. 41, 44.

Through the kindness of Dr. Fischer I was able to examine the holotype. It much resembles *B. compressiventris*, but lengths of femur, tibia and basitarsus of hind leg are 5.5, 9.2 and 6.5 times their width, respectively (Fig. 41); also the antenna differs slightly (Fig. 40). Species only known from Central Europe, seldom collected.

Ischnotron subgen. nov.
(Fig. 42—45, 58—71)

Etymology: from "ischnos" (Greek for slender) and "otron" (Greek for abdomen) because of its slender metasoma; gender, neuter.

Type-species: *Blacus parvus* Haeselbarth.

Diagnosis. — Length of body 1.5—2.2, length of fore wing 1.5—2.1 mm; antennal segments of ♀ 17—20 (♂ unknown); eye bare; occipital carina completely absent (but remnant of occipital flange present in *javensis*); frons and vertex smooth; face smooth or nearly so; length of malar space about equal to basal width of mandible, somewhat shorter in *parvus*, somewhat longer in *fulvicollis*; malar suture present; side of pronotum largely smooth; epicnemial suture smooth; precoxal suture more or less reduced, at least partly crenulate except in *javensis* (Fig. 58, 67); metapleural flange small to medium-sized, sharp; notauli largely reduced to completely developed and crenulate; scutellar suture deep and wide, with one longitudinal carina; scutellum smooth, its lateral carina complete, but in *fulvicollis* partly reduced or absent, not protruding apically; side of scutellum smooth, except for some short crenulae; parastigma small to rather large; 1st discoidal cell more or less truncate anteriorly; r2 straight or slightly bent; d 1 : d 2 = 1 : 7.7—30; metacarp not or slightly surpassing radial cell; length of hind femur 5.2—6.4 times its width; hind coxa smooth; all claws of ♀ simple; propodeal tubercle absent; propodeal carinae distinct, medial carina divided, forming a slender medial area (Fig. 44, 63); ovipositor more or less bent ventrad; length of ovipositor sheath 0.27—0.38 times fore wing; metasoma after 2nd tergite smooth; 2nd tergite smooth or finely and longitudinally rugose; metasoma more or less compressed apically; hypopygium medium-sized to large (Fig. 58, 67).

Distribution. — Palaearctic: one species; Ethiopian: two species; Oriental: one species.

Note. Superficially *Ischnotron* resembles *Leioblacus*, but *Ischnotron* has a carina in scutellar suture, malar suture present, head transverse and occipital carina completely absent.

Important apomorphous characters are: 1 — occipital carina completely absent; 2 — malar suture present; 3 — sculpture of precoxal suture reduced; 4 — ovipositor more or less bent ventrad; 5 — hypopygium medium-sized to large; 6 — metasoma more or less compressed.

Key to species of the subgenus *Ischnotron*

1. Notauli superficial, absent apicad (Fig. 64); lateral carina of scutellum indistinct; ovipositor sheath somewhat longer or about equal to hind tibia . . . . . *parvus* Haeselbarth (p. 184)

— Notauli deep, present apically (Fig. 42, 65); lateral carina of scutellum distinct, at least apically; length of ovipositor sheath shorter than hind tibia (Fig. 67, 70) . . 2
2. First metasomal tergite distinctly widened apicad, slightly shorter than twice its apical width; antennal segments of ♀ 20 . . . . . *fulvicollis* Haeselbarth (p. 184)
— First tergite not or scarcely widened apicad (Fig. 44, 68), length more than twice its apical width; antennal segments of ♀ 18—19 3
3. First metasomal tergite more slender (Fig. 68), length 3.1 times its apical width; temples more narrowed, length of eye 1.4 times temple dorsally (Fig. 66); mesosoma yellowish; notauli wider and deeper (Fig. 65); scutellum stout (Fig. 65); head in frontal aspect distinctly narrowed ventrad (Fig. 71); length of malar space equal to basal width of mandible . . . . . *javensis* spec. nov. (p. 184)
— First tergite less slender (Fig. 44), length 2.4—2.5 times its apical width; temples less narrowed, length of eye 1.7 times temple dorsally (Fig. 45); mesosoma dark reddish brown; notauli narrower and less deep (Fig. 42); scutellum more slender (Fig. 42); head in frontal aspect less narrowed ventrad (Fig. 43); length of malar space distinctly less than basal width of mandible . . *gracilis* Haeselbarth (p. 185)

Blacus (Ischnotron) parvus Haeselbarth (Fig. 58—64)

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 78—79.

Described from S. Africa (Transvaal); antennal segments of ♀ usually 18, less frequently 17, and basal 0.6—0.8 of 2nd metasomal tergite finely longitudinally rugose but figured specimen from Zaïre (Elisabethville, ii.1940, H. J. Brédo, MAC) and a ♂ from S. Africa ("Mossel Bay, Cape Province, October, 1921", BM) have 2nd tergite smooth. Further data of figured specimen: length of 3rd segment 1.6 times 4th segment, length of 3rd and 4th segments 5.5 and 3.5 times their width, respectively; dorsal length of eye 1.9 times temple (Fig. 60); POL : Ø ocellus : OOL = 3 : 2 : 5; length of mesosoma 1.3 times its height; zone behind prepectal carina smooth; precoxal suture reduced, short crenulae in middle only; notauli present in basal half only (Fig. 64); mesoscutal lobes moderately convex; lateral carina of scutellum complete, rather strongly developed; first discoidal cell narrowly truncate anteriorly in right wing, but wider in left wing; r2 slightly bent; length of femur, tibia and basitarus of hind leg 5.8, 10.0 and 9.5 times their width, respectively; surface of propodeum smooth, but superficially rugose apically; length of 1st metasomal tergite 2.7 times its apical width, surface superficially rugose, dorsal carinae almost reach apex (Fig. 63), spiracle flat; ovipositor slightly bent; length of ovipositor sheath 0.38 times fore wing.

Blacus (Ischnotron) fulvicollis Haeselbarth

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 79—80.

Described from same locality as *parvus*, but less common.

Blacus (Ischnotron) javensis spec. nov. (Fig. 65—71)

Holotype, ♀, length of body and of fore wing 1.6 mm.

Head. — Antennal segments 19, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.5 and 3.8 times their width, respectively, length of penultimate segments about twice their width; dorsal length of eye 1.4 times temple, temple roundly

narrowed apicad; POL : Ø ocellus : OOL = 7 : 3 : 8; frontal suture absent; apical margin of clypeus straight medially.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum smooth, except for some carinae and microsculpture anteriorly; zone behind prepectal carina smooth except for some short carinae; precoxal suture almost smooth, shallowly depressed medially; metapleural flange sharp, medium-sized; notauli deep, wide and completely crenulate; mesoscutal lobes moderately convex; scutellum rather truncate apically, its lateral carina complete, medium-sized; propodeum smooth except for strongly developed carinae which form 3 posterior areas, its middle area rather slender (Fig. 68).

Wings. — First discoidal cell truncate anteriorly; r 2 straight; d 1 : d 2 = 1 : 30 but nervulus and nervellus indistinct, almost completely absent (Fig. 69); parastigma rather large; cu 1 and n. rec. weakly sclerotized; subdiscoideus almost straight.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.4, 10.0 and 8.2 times their width, respectively.

Metasoma. — Length of 1st metasomal tergite 3.1 times its apical width, surface smooth, except for some superficial rugae (Fig. 68), dorsal carinae distinct in basal nine-tenth, spiracle flat; 2nd tergite smooth; ovipositor bent ventrad; length of ovipositor sheath 0.30 times fore wing; hypopygium large (Fig. 67); metasoma strongly compressed in apical half.

Colour. — Yellowish; antenna (except for 4 basal segments), stemmaticum, wing veins, pterostigma and apical half of metasoma, brown.

Holotype ♀ in BM, London: "Java, Bogor, 24-25.iv.1954, A. H. G. Alston, B.M. 1954-414", "at light".

Blacus (Ischnotron) gracilis Haeselbarth (Fig. 42—45)

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 121—122, Fig. 42, 43, 45.

Through the kindness of Dr. Haeselbarth I was able to study the paratype from Marling (nr. Meran, Italy). Length of 1st metasomal tergite 2.5 times its apical width (Fig. 44); length of ovipositor sheath 0.27 times fore wing; ovipositor distinctly bent ventrad; dorsal length of eye 1.7 times temple (Fig. 45); temples relatively less narrowed; nervulus and nervellus indistinct, almost absent; subdiscoideus almost straight.

Tarpheion subgen. nov.
(Fig. 39, 72—133, 289—291)

Etymology: from "tarpheios" (Greek for thick) because of the relatively short and wide body; gender, neuter.

Type-species: *Blacus chillcotti* spec. nov.

Diagnosis. — Length of body and of fore wing 1.5—3.5 mm; antennal segments of ♀ 18—27, usually 20—23; eye bare; occipital carina present, at least laterally; face, clypeus, frons and vertex smooth; apical margin of clypeus straight medially; length of malar space equal to or ± twice basal width of mandible; malar suture present; side of middle lobe of mesoscutum more or less rugose; precoxal suture complete, more or less crenulate (Fig. 88, 95); metapleural flange distinct, medium to large; notauli complete, usually wide and crenulate; scutellar suture wide and deep, in examined species with one large longitudinal carina; scutellum smooth, its carina usually complete, its side rugose, seldom reticulate; parastigma medium-sized to large; r 2 straight or nearly so;

1st discoidal cell sharp to truncate anteriorly; d 1 : d 2 = 1 : 1.9—15.0; metacarp not distinctly surpassing radial cell; length of hind femur 5.6—7.6 times its width; hind coxa rugose to smooth dorsally; fore claw of ♀ with blackish bristles or simple; middle and hind claws simple; propodeal tubercle absent; medial carina of propodeum divided, medial area usually wide dorsally (Fig. 73, 94); ovipositor bent ventrad; length of ovipositor sheath 0.16—0.43 times fore wing; 2nd tergite of metasoma usually sculptured (Fig. 86, 94); hypopygium (rather) large.

Distribution. — Nearctic: one species; Neotropical: three species; Ethiopian: eight species; Palaearctic: two species.

Note. Important apomorphous characters are: 1 — malar suture present; 2 — lateral carina of scutellum complete; 3 — ovipositor bent ventrad; 4 — hypopygium relatively large.

Key to Nearctic and Neotropical species of the subgenus *Tarpheion*

1. Fore claw of ♀ with distinct, blackish bristles (Fig. 77); length of ovipositor sheath 0.19—0.23 times fore wing 2
— Fore claw of ♀ simple, at most with yellowish, small bristles; length of ovipositor sheath 0.29—0.36 times fore wing 3
2. Pterostigma yellow, relatively slender, r 1 somewhat longer than its width (Fig. 74); antennal segments of ♀ 23; 1st metasomal tergite less dilated apicad and constricted subbasally (Fig. 73); discoidal cell widely truncate anteriorly (Fig. 74); lateral carina of scutellum equally developed (Fig. 75) . . . . . *cerinus* spec. nov. (p. 187)
— Pterostigma brown, stout, r 1 subequal to its width (Fig. 84); antennal segments of ♀ 22; 1st metasomal tergite distinctly dilated apicad and constricted subbasally (Fig. 86); discoidal cell sharp anteriorly or nearly so; medially lateral carina of scutellum weakly developed as compared with its apical part (Fig. 83) . . . . . *constrictus* spec. nov. (p. 188)
3. First metasomal tergite 1.5—1.8 times its apical width, distinctly widened apically (Fig. 94), surface less shiny, densely sculptured; dorsal length of eye 2.2—2.5 times length of temple, eye somewhat smaller (Fig. 89); striae of 2nd metasomal tergite closely spaced, reaching apex of tergite or almost so (Fig. 94); precoxal suture distinctly reticulate (Fig. 88) . . . . . *chillcotti* spec. nov. (p. 189)
— First metasomal tergite 1.8—2.0 times its apical width, usually scarcely widened apically (Fig. 101), seldom somewhat more dilated, surface more shiny, less densely sculptured; dorsal length of eye 2.9—3.3 times length of temple, eye somewhat larger (Fig. 98); striae of 2nd metasomal tergite usually indistinct and relatively widely spaced (Fig. 101), sometimes more pronounced, at most on basal 0.7 of tergite; precoxal suture almost smooth, except for some rather superficial rugae (Fig. 95) . . . . . *erugatus* spec. nov. (p. 190)

Key to Ethiopian species of the subgenus *Tarpheion*

1. Scutellum strongly and completely reticulate; antennal segments 26—27; fore claw with long, blackish bristles (cf. Fig. 77) . . . *annulicornis* Haeselbarth (p. 190)
— Scutellum largely smooth; antennal segments 18—23; fore claw simple 2
2. Second metasomal tergite nearly or completely smooth (Fig. 113) 3
— Second metasomal tergite distinctly striate (Fig. 115) 4

3. Temple slightly longer than eye dorsally (Fig. 103); length of malar space about twice basal width of mandible (Fig. 105); mesoscutum slender (Fig. 107) . . . . . *decaryi* Granger (p. 191)
— Temple much shorter than eye dorsally (Fig. 109); length of malar space about equal to basal width of mandible (Fig. 111); mesoscutum stout (Fig. 112) . . . . . *convexus* spec. nov. (p. 191)
4. Antennal segments 18; occipital carina complete . . *nanulus* Haeselbarth (p. 192)
— Antennal segments 21—23; occipital carina partly absent or complete 5
5. Antennal segments 22—23; lateral carina of scutellum bent (Fig. 291); hind femur widened (Fig. 1 in Haeselbarth, 1974) . . . *schimitscheki* Haeselbarth (p. 192)
— Antennal segments 21; lateral carina of scutellum rather straight (Fig. 112); hind femur less widened 6
6. Length of ovipositor sheath about 1.15—1.20 times length of hind tibia . . . 7
— Length of ovipositor sheath about equal to length of hind tibia or less 8
7. First metasomal tergite evenly, longitudinally striate (Fig. 39), dorsal carinae relatively weak; precoxal suture widely spaced reticulato-rugose anteriorly; apical segments of antenna relatively wider; basal half of 2nd metasomal tergite striate . . . . . *gibber* Haeselbarth (p. 192)
— First metasomal tergite scarcely striate, dorsal carinae strongly developed (Fig. 115); precoxal suture with some weak crenulae; apical segments of antenna more slender (Fig. 114); basal 0.7 of 2nd metasomal tergite striate . . . . . *transversus* spec. nov. (p. 192)
8. Scutellum wider, lateral carina absent anteriorly or indistinct; hypopygium yellowish or white; occipital carina laterally present only; length of ovipositor sheath about equal to length of hind tibia . . . . . *townesi* Haeselbarth (p. 193)
— Scutellum rather narrow[1]), lateral carina distinct anteriorly (Fig. 289); hypopygium brownish; occipital carina usually complete, sometimes medio-dorsally weakly developed; length of ovipositor sheath usually about 0.8 times length of hind tibia . . . . . *schwenkei* Haeselbarth (p. 193)

Key to Palaearctic species of the subgenus *Tarpheion*

1. Antenna tricoloured, 6 apical segments more or less yellowish-white, remaining part brown, yellowish basad; length of ovipositor sheath 0.16 times length of fore wing; hypopygium yellowish; middle lobe of mesoscutum slightly, but distinctly concave anteriorly (Fig. 124); lateral carina of scutellum lamelliform (Fig. 124); pterostigma brownish . . . . . *apicalis* spec. nov. (p. 193)
— Antenna bicoloured, apical segments brownish, remaining segments yellowish; length of ovipositor sheath 0.39 times fore wing; hypopygium brownish; middle lobe of mesoscutum evenly convex (Fig. 130); pterostigma yellowish; lateral carina of scutellum weakly developed (Fig. 130) . . *artomandibularis* spec. nov. (p. 194)

Blacus (Tarpheion) cerinus spec. nov. (Fig. 72—79)

Holotype, ♀, length of body and of fore wing 3.0 mm.

Head. — Antennal segments 23, length of 3rd segment 1.4 times 4th segment, length

[1]) If scutellum is rounded and less narrowed apicad (Fig. 112) cf. *convexus*.

of 3rd and 4th segments 6.3 and 4.7 times, respectively, length of penultimate segments 1.9—2.0 times their width; dorsal length of eye 2.8 times temple (Fig. 79); POL : Ø ocellus : OOL = 4 : 3 : 7; frontal suture absent; area in front of occipital carina finely crenulate; malar space equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.2 times its height; side of pronotum reticulate except for dorsal third; zone behind prepectal carina almost smooth; epicnemial suture almost smooth except for some superficial rugae; precoxal suture narrowed anteriorly, with distinct rugae (Fig. 72); metapleural flange large, blunt; notauli deep, with widely spaced crenulae; mesoscutal lobes flattened dorsally, middle lobe somewhat concave anteriorly (Fig. 75); lateral carina of scutellum complete, distinctly developed; dorsal surface of propodeum smooth except for lamelliform carinae, apical surface reticulate (Fig. 73).

Wings. — First discoidal cell widely truncate anteriorly; parastigma large, but weakly developed; d 1 : d 2 = 9 : 23; r 1 slightly longer than width of pterostigma.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 9.8 and 10.0 times their width, respectively; fore tarsal claw with long, blackish bristles and teeth (Fig. 77); middle and hind claws simple; hind coxa rugose dorso-basally.

Metasoma. — Length of 1st tergite 2.1 times its apical width, surface with widely spaced rugae, medially superficially rugose (Fig. 73), dorsal carinae distinctly developed in basal three-fifths, spiracle flat; basal four-fifths of 2nd tergite with widely spaced striae (Fig. 73), remaining smooth; length of ovipositor sheath 0.22 times fore wing.

Colour. — Reddish brown; face, clypeus, labrum, mandible, base of antenna, palpi, tegulae, metasoma ventro-basally, pterostigma and legs, yellowish; hypopygium, yellowish brown; stemmaticum and metasoma apically, blackish.

Holotype ♀ in BM, London: "Brazil, Nova Teutonia, 27°11'B, 52°23'L, 28.vii.1937, Fritz Plaumann, B.M. 1937-656".

Paratype: topotypic, 7.x.1938 (AC), propodeum rather weakly reticulate, ♀.

Note. *B. (T.) cerinus* forms with *constrictus* and the African *annulicornis* a distinct group in *Tarpheion*, characterized by the blackish bristles of the fore claw and the relatively large size.

Blacus (Tarpheion) constrictus spec. nov. (Fig. 80—87)

Holotype, ♀, length of body and of fore wing 2.4 mm.

Head. — Antennal segments 22, length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segment 7.0 and 5.0 times their width, respectively, length of penultimate segments 2.0—2.2 times their width; dorsal length of eye 2.1 times temple; POL : Ø ocellus : OOL = 5 : 4 : 13; frontal suture absent; area in front of occipital carina almost smooth, indistinctly crenulate laterally; length of malar space somewhat less than basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulato-rugose except for dorsal two-fifth; zone behind prepectal carina smooth, except near precoxal suture, crenulate; epicnemial suture smooth; precoxal suture with widely spaced crenulae (Fig. 80); metapleural flange large; notauli deep, with widely spaced crenulae; mesoscutal lobes flattened dorsally, middle lobe somewhat concave anteriorly; lateral carina of scutellum distinct but medially irregular, apically lamelliform and slightly protruding; dorsal surface of propodeum smooth, posterior surface reticulate (Fig. 86).

Wings. — First discoidal cell sharp anteriorly; parastigma large but posterior margin coloured only; d 1 : d 2 = 4 : 9; r 1 somewhat shorter than width of pterostigma (Fig. 84).

Legs. — Length of femur, tibia and basitarsus of hind leg 5.8, 10.8 and 10.0 times its width, respectively; fore tarsal claw with long blackish bristles and teeth (Fig. 81); middle and hind claws simple; hind coxa rugose dorsally.

Metasoma. — Length of 1st tergite 2.1 times its apical width, surface longitudinally striato-rugose, medially rugoso-reticulate, dorsal carinae distinct in basal two-third, spiracle flat (Fig. 86); length of ovipositor sheath 0.19 times fore wing; basal four-fifth of 2nd tergite striato-rugose, remaining smooth.

Colour. — Reddish brown; palpi, base of antenna, antennal sockets, clypeus, labrum, mandible, tegulae, ventral part of prothorax and metasoma antero-ventrally, yellow; hypopygium yellowish brown, somewhat hyaline; legs yellow but coxae and trochanters rather whitish; pterostigma brown, but its basal and apical tips, parastigma largely and metacarp, yellowish white.

Holotype ♀ in BM, London: "Brazil, Nova Teutonia, 27°11'B, 52°23'L, 18.v.1938, Plaumann, B.M. 1938-682".

Paratypes: all topotypic: ♂, allotype, 22 antennal segments, 24.v.1938 (BM); 2 ♀, 25.iv.1936 (AC), 22 antennal segments and iii.1967 (CNC).

Blacus (Tarpheion) chillcotti spec. nov. (Fig. 88—94)

Holotype, ♀, length of body 2.0, length of fore wing 2.3 mm.

Head. — Antennal segments 22 (in ♀ paratypes 20, 21 and 22 (2×), ♂ 22), length of 3rd segment 1.5 times 4th segment, length of 3rd and 4th segments 7.5 and 5.0 times their width, respectively, length of penultimate segments 1.5 times their width; dorsal length of eye 2.2 (—2.5 in paratypes) times temple; POL : Ø ocellus : OOL = 3 : 2 : 5; frontal suture shallow; area in front of occipital carina remotely crenulate; length of malar space somewhat longer than basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum rugoso-reticulate except for dorsal third; zone behind prepectal carina finely crenulate; epicnemial suture almost smooth; precoxal suture reticulate, wide medially (Fig. 88); metapleural flange distinct; notauli deep, crenulate; mesoscutal lobes moderately convex; lateral carina of scutellum strongly developed, complete; propodeum smooth dorsally, reticulate posteriorly (Fig. 94).

Wings. — First discoidal cell truncate anteriorly; parastigma large; d 1 : d 2 = 9 : 17.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.4, 10.5 and 8.0 times their width, respectively; all claws simple; hind coxa coriaceous.

Metasoma. — Length of 1st tergite 1.5 (—1.7 in paratypes) times its apical width, surface densely covered with fine, longitudinal (and somewhat reticulate) rugae (Fig. 94), dorsal carinae distinct in basal third, spiracle flat; 2nd tergite finely striate, except for apical corners; length of ovipositor sheath 0.29 times fore wing.

Colour. — Reddish brown; head dorsally and posteriorly, antenna apically and metasoma, dark brown; pterostigma brown; basal segments of antenna, palpi and legs, yellowish.

Holotype ♀ in CNC, Ottawa: "Whiteside Mt., Highlands, N.C., 20.vii.1957", "collector J. G. Chillcott".

Paratypes: Looking Glass Rock nr. Pisgah Forest, North Carolina, 2500 ft, 19.vii.1957, 2 ♀ (CNC, AC); Moorestown, New Jersey, viii.1.1939 (USNM), ♀; Pine Mtn., Georgia, 3000 ft, 26.vii.1957 (allotype, CNC), antennal segments 22, and 2nd tergite striate basally only; Dundas, Ontario, 7-11.vii.1972, ♀ (CNC).

This species is dedicated to the late Dr. J. G. Chillcott, who collected many interesting and nicely preserved specimens.

Blacus (Tarpheion) erugatus spec. nov. (Fig. 95—101)

Holotype, ♀, length of body 1.9, length of fore wing 2.0 mm.

Head. — Antennal segments 22 (also in 3 paratypes, but 2 paratypes have 21, 1 has 20 and 1 has 23; the only known ♂ has left 20 and right 19 segments), length of 3rd segment 1.5 times 4th segment, length of 3rd and 4th segments 5.3 and 3.9 times their width, respectively, length of penultimate segments twice their width; dorsal length of eye 2.9 (—3.3 times in paratypes) temple; POL : Ø ocellus : OOL = 3 : 2 : 5; frontal suture superficial; area in front of occipital carina finely crenulate; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum with widely spaced rugae, except in dorsal 0.3 (Fig. 95); zone behind prepectal carina crenulate; epicnemial suture superficially rugose, almost smooth; precoxal suture almost smooth, except for some rugae (Fig. 95); metapleural flange distinct; notauli superficially crenulate; mesoscutal lobes rather flat; lateral carina of scutellum complete, distinct; propodeum almost smooth dorsally, reticulate posteriorly (Fig. 101).

Wings. — First discoidal cell truncate anteriorly; d 1 : d 2 = 7 : 16; parastigma large but weakly developed.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.2, 10.6 and 8.3 times their width, respectively; all claws simple; hind coxa almost smooth, with some superficial microsculpture dorsally.

Metasoma. — Length of first tergite 1.8 (—2.0 in paratypes) times its apical width, surface superficially rugoso-striate (Fig. 101), dorsal carinae almost complete, spiracle flat; 2nd tergite smooth, except for some superficial and widely placed microsculpture (Fig. 101) (if more pronounced, as in paratypes, then at most on basal two-thirds of tergite); length of ovipositor sheath 0.38 times fore wing (one paratype: 0.29 times).

Colour. — Reddish brown; basal half of antenna, palpi, head (except stemmaticum) parastigma, tegulae and metasoma ventrally, yellowish; pterostigma, brown; stemmaticum, black.

Holotype ♀ in CNC, Ottawa: "Pompeya, Napo R., Pastaza, EUCAD., 14-22.v.1965, L. Pena". Paratypes: (BM, AC, CNC), 10 ♀ : 1 topotypic; 9 from Brazil, Nova Teutonia, mainly collected in August and September and 3 from Jatai, Golas; 1 ♂, allotype, Brazil, Nova Teutonia, 14.vi.1937 (BM).

Note. This species is closely related to *chillcotti*, but *chillcotti* has a Nearctic and *erugatus* a Neotropical distribution. Because of the variability of *erugatus* only discernable by rather subtile differences.

Blacus (Tarpheion) annulicornis Haeselbarth

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 71—72.

Through the kindness of Dr. Haeselbarth I have a paratype from the type-locality at my

disposal. Examined an additional ♀ from BM: "Tanganyika, Mahali Peninsula, 15.ix. 1959, 2nd Oxford U. Exped. B.M. 1960-279", "Kungwe Camp: South ridge. 6,000 ft.". The species is conspicuous by the number of antennal segments, colour of antenna, and blackish bristles of fore claw.

Blacus (Tarpheion) decaryi Granger (Fig. 102—107)

Granger, 1949, Mém. Inst. scient. Madagascar 2A: 331—332, Fig. 342.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.

Holotype, ♂, length of body and of fore wing 2.0 mm.

Head. — Antennal segments 21, length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 5.5 and 4.0 times their width, respectively, length of penultimate segments ca. 1.5 times their width; dorsal length of eye 0.9 times temple; POL : Ø ocellus : OOL = 8 : 3 : 9; frontal suture absent; area in front of occipital carina finely crenulate; length of malar space about twice basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum with microsculpture except for postero-dorsal smooth area (Fig. 102); area behind prepectal carina smooth; precoxal suture bicurved, with weakly developed crenulae; epicnemial suture smooth; notauli narrow and smooth except for some microsculpture anteriorly, connected with scutellar suture; lateral carina of scutellum complete, weakly developed; propodeum almost smooth dorsally, superficially rugose posteriorly, propodeum evenly sloping.

Wings. — First discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 2 : 9; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.3, 9.4 and 10.0 times their width, respectively; all claws simple; hind coxa superficially rugose dorsally.

Metasoma. — Length of 1st tergite 1.8 times its apical width, surface smooth except for some rugae (Fig. 106), dorsal carinae distinct in basal two-fifths, spiracle protruding; 2nd tergite smooth.

Colour. — Reddish brown; apical half of metasoma darkened; legs and pterostigma, yellowish.

Holotype ♂ in MNHN, Paris: "Madagascar, Amparafaravola, O. du Lac Alaotrai, R. Decary, 1921", "♂, 21", "type".

Note. Because males are difficult to identify, the placing of *decaryi* in *Tarpheion* is uncertain until the ♀ is found. None of the ♀ specimens from Madagascar examined has the aberrantly long malar space, characteristic for this species; also aberrant in *Tarpheion* is the relatively long temple (Fig. 103).

Blacus (Tarpheion) convexus spec. nov. (Fig. 108—113)

Holotype, ♀, length of body and of fore wing 2.1 mm.

Head. — Apical antennal segments broken off; length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 6.3 and 4.5 times their width, respectively; dorsal length of eye 1.9 times temple; POL : Ø ocellus : OOL = 5 : 4 : 11; frontal suture absent; area in front of occipital carina nearly smooth; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum smooth, except for some carinae; zone behind prepectal carina distinctly crenulate; epicnemial suture smooth; precoxal suture crenulate apically only (Fig. 108); metapleural flange

medium-sized; notauli completely crenulate; mesoscutal lobes rather convex; lateral carina of scutellum distinct, complete; propodeum smooth, except for distinct carinae (Fig. 113).

Wings. — First discoidal cell nearly sharp anteriorly; d 1 : d 2 = 3 : 23; parastigma large but weakly developed.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.0, 12.7 and 14.0 times their width, respectively; all claws simple; hind coxa smooth.

Metasoma. — Length of 1st tergite 1.7 times its apical width, surface superficially and longitudinally rugose (Fig. 113), dorsal carinae distinct in basal half, spiracle almost flat; 2nd tergite with indistinct rugae, almost smooth; length of ovipositor sheath 0.26 times fore wing.

Colour. — Dark reddish brown; clypeus, labrum, mandible, base of antenna, palpi, tegulae and legs, yellowish.

Holotype ♀ in MAC, Tervuren: "Madagascar, Ankaratra, iv.1944, A. Seyrig". Paratypes: 2 ♂ from type-locality, one the allotype, antennal segments 21 and length of 1st metasomal tergite 2.3 times its apical width (MAC, AC); 2 ♂ from Ambositra, Madagascar, ii.1944, 2nd metasomal tergite more distinctly rugose and length of 1st tergite 2.5 times its apical width (MAC).

Note. Closely related to *transversus* and *schwenkei*. *B. convexus* differs from *transversus* by the relatively convex mesoscutal lobes, the less sculptured 2nd metasomal tergite and the shorter ovipositor sheath. It differs from *schwenkei* by the apically relatively truncate scutellum. (Fig. 112 versus Fig. 289) and the less sculptured 2nd metasomal tergite.

Blacus (Tarpheion) nanulus Haeselbarth

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 78.

Small species, superficially similar to *Blacus* (*Ischnotron*) *parvus* Haeselbarth; described from Transvaal, S. Africa.

Blacus (Tarpheion) schimitscheki Haeselbarth (Fig. 291)

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 72—73, Fig. 1.

Size similar to *annulicornis* but the paratypes, kindly given to me by Dr. Haeselbarth, have their fore claw simple and apical segments of antenna brown. Further I have examined 2 ♀ from S. Africa, Pondoland, Sept. 1923 and Aug. 15-31, 1923.

Blacus (Tarpheion) gibber Haeselbarth (Fig. 39)

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 73—74, Fig. 2.

The paratypes given to me by Dr. Haeselbarth differ from *transversus* by the shape and sculpture of 1st metasomal tergite (Fig. 39 versus Fig. 115), the less slender apical segments of antenna, the less distinctly striate 2nd tergite and by the precoxal suture which has more distinct crenulae.

Blacus (Tarpheion) transversus spec. nov. (Fig. 114—119)

Holotype, ♀, length of body 2.1, length of fore wing 2.6 mm.

Head. — Apical segments of antenna broken off; length of 3rd antennal segment 1.3 times 4th segment; length of 3rd and 4th segments 6.5 and 4.5 times their width,

respectively, penultimate segments ca. twice their width; dorsal length of eye 2.6 times length of temple; POL : Ø ocellus : OOL = 7 : 4 : 12; area in front of occipital carina virtually smooth; length of malar space somewhat more than basal width of mandible.

Mesosoma. — Length of mesosoma 1.2 times its height; side of pronotum smooth, except for some carinae (Fig. 114); zone behind prepectal carina crenulate; precoxal suture with widely spaced crenulae, short; metapleural flange small; notauli distinctly crenulate; mesoscutal lobes scarcely convex, flattened apicad; lateral carina of scutellum complete; propodeum nearly smooth (Fig. 115).

Wings. — First discoidal cell rather truncate anteriorly; d 1 : d 2 = 1 : 15; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.0, 11.7 and 11.0 times their width, respectively; all claws simple; hind coxa smooth.

Metasoma. — Length of 1st tergite 1.8 times its apical width, surface smooth, except for some rugae medio-apically (Fig. 115), dorsal carinae nearly reach apex, spiracle flat; 2nd tergite with strongly developed, sloping striae; length of ovipositor sheath 0.43 times fore wing.

Colour. — Dark reddish brown; pterostigma (except whitish base), brown; head largely (except for 3 dark spots of stemmaticum) brownish yellow; basal half of antenna, tegulae, palpi and legs, pale yellow.

Holotype ♀ in MAC, Tervuren: "Madagascar, La Mandraka, ii.1944, A. Seyrig". Paratypes: 2 ♂ from type-locality (MAC, allotype; AC); essentially as ♀; antennal segments 22, antenna dark brownish, but 2nd and 14th-20th segments yellowish and 1st metasomal tergite more rugose, as propodeum posteriorly.

Blacus (Tarpheion) townesi Haeselbarth

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 76—77, Fig. 4.

The types are from S. Africa; I have seen 13 ♀ specimens from Port St. John, Pondoland, S. Africa, R. E. Turner, July 10-31, 1923 (8), Aug. 15-31, 1923 (3), Nov. 1923 (1) and Dec. 1923 (1), all with 21 antennal segments (BM, AC).

Blacus (Tarpheion) schwenkei Haeselbarth (Fig. 289, 290)

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 75—76, Fig. 3.

The specimens excluded from the type-series by Haeselbarth (1974: 76) may partly belong to *convexus*; they are from S. Africa, while *convexus* is described from Madagascar; in any case this species is closely related to *convexus*.

Blacus (Tarpheion) apicalis spec. nov. (Fig. 120—126)

Holotype, ♀, length of body and of fore wing 1.5 mm.

Head. — Antennal segments 20 (as paratypes); length of 3rd segment 1.6 times 4th segment, length of 3rd and 4th segments 6.0 and 3.6 times their width, respectively, length of penultimate segments 1.8—2.0 times their width; dorsal length of eye 1.9 times temple; POL : Ø ocellus : OOL = 5 : 3 : 9; frontal suture absent; area in front of occipital carina smooth; length of malar space ± 1.3 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum smooth, except for some widely spaced reticulation in ventral half (Fig. 120); zone behind

prepectal carina crenulate; epicnemial suture smooth; precoxal suture with some crenulae in middle part (Fig. 120); metapleural flange distinct; notauli with some widely spaced crenulae; mesoscutal lobes moderately convex, its middle lobe slightly concave anteriorly (Fig. 124); lateral carina of scutellum lamelliform, complete, truncate apically (Fig. 124); propodeum smooth except for some indistinct microsculpture.

Wings. — First discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 3 : 23; parastigma medium-sized; r 2 somewhat bent.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 10.0 and 11.0 times their width, respectively; all claws simple; hind coxa smooth.

Metasoma. — Length of 1st tergite 2.1 (—2.3 in paratypes) times its apical width, surface rather superficially reticulato-rugose in middle of apical half, remaining surface almost smooth (Fig. 126), dorsal carinae distinct in basal two-thirds, spiracle flat; part of 2nd tergite superficially rugose (Fig. 126); length of ovipositor sheath 0.16 times fore wing.

Colour. — Metacarp, tegulae, legs and head, yellowish; mesosoma, reddish brown (but propodeum more brownish); pterostigma, most veins and metasoma brown, but 2nd and 3rd segments and hypopygium, more yellowish white; stemmaticum, black; palpi and 6 apical segments of antenna, yellowish white; 10 middle segments of antenna, brown and its 4 basal segments, yellowish (in paratypes usually more extended).

Holotype ♀ in BM, London: "Swept from dwarf bamboos in deep ravine, c. 2000′, 12.xii.1961", "Arun Valley above River Sabhaya east shore", "Brit. Mus. East Nepal Exp. 1961-62. R. L. Coe Coll. B.M. 1962-177". Paratypes: 11 ♀, all topotypic and same date (BM, AC).

Note. Very distinctive species, well characterized by its tricoloured antenna, small size and concave middle lobe of mesoscutum.

Blacus (Tarpheion) artomandibularis spec. nov. (Fig. 127—133)

Holotype, ♀, length of body 1.8, length of fore wing 2.3 mm.

Head. — Antennal segments 20 (as in ♀ paratype); length of 3rd segment 1.4 times 4th segment; length of 3rd and 4th segments 4.7 and 3.3 times their width, respectively, length of penultimate segments 1.9—2.1 times their width; dorsal length of eye 2.0 times length of temple; POL : Ø ocellus : OOL = 6 : 3 : 10; frontal suture absent; area in front of occipital carina smooth; length of malar space 1.2 times basal width of mandible; species named after the mandible because it is so distinctly narrowed apicad.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum sparsely reticulate; zone behind prepectal carina crenulate; epicnemial suture smooth; precoxal suture with widely spaced crenulae (Fig. 127); metapleural flange medium-sized; notauli with rather closely placed, fine crenulae; mesoscutal lobes distinctly convex; lateral carina of scutellum rather weakly developed, especially medially indistinct, slightly protruding apically (Fig. 127, 130); propodeum smooth dorsally, superficially rugose posteriorly.

Wings. — First discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 5 : 20; parastigma medium-sized.

Legs. — Length of femur, tibia and basitarsus of hind leg 7.6, 11.8 and 10.5 times their width, respectively; all claws simple; hind coxa smooth.

Metasoma. — Length of 1st tergite 2.2 (—2.4 in ♀ paratype) times its apical width, surface smooth, but medio-apically rugose, dorsal carinae distinct in basal two-thirds,

spiracle slightly protruding (Fig. 133); 2nd tergite with some longitudinal striae (Fig. 133); length of ovipositor sheath 0.39 (0.30 in paratype) times fore wing.

Colour. — Reddish brown; stemmaticum and apex of metasoma blackish; legs, palpi, clypeus, labrum, mandible, antenna (except for both brown apical segments), parastigma, cu 2, metacarp, base of metasoma ventrally, tegulae and pterostigma, yellowish.

Holotype ♀ in BM, London: "Taplejung Distr., above Sangu. Mixed vegetation in dried-up ravine, c 6800′, 16.ii.1962", "Brit. Mus., East Nepal Exp. 1961-62, R. L. Coe Coll. B. M. 1962-177". Paratype: 1 ♀, topotypic, c 6200′, 25-28.x.1961, old mixed forest (AC) (pterostigma dark brown).

Note. Related to *convexus* and *transversus* from Madagascar, but *artomandibularis* is distinguished from *convexus* by the 1st tergite which is less dilated posteriorly. From *transversus* it differs by the less transverse head (Fig. 131 versus Fig. 119) and the less sculptured 2nd metasomal tergite.

Contochorus subgen. nov.
(Fig. 134—140)

Etymology: From "kontos" (Greek for short) and from "chora" (Greek for room or space) because of the short medial area of the propodeum; gender, neuter.

Type-species: *Blacus glabrum* spec. nov.

Diagnosis. — Small, antennal segments of ♀ 17, of ♂ 16; eye setose; occipital carina complete, with widely spaced crenulae; scutellar suture deep, wide, with one longitudinal basal width of mandible; malar suture distinct; epicnemial suture smooth; precoxal suture smooth, shallow depression only; metapleural flange rather small but distinct; notauli complete, with widely spaced crenulae; scutellar suture deep and wide, one longitudinal carina; scutellum smooth, its lateral carina complete, lamelliform (Fig. 135), slightly protruding apically (Fig. 134), its side rugose; dorsal surface of propodeum distinctly longer than posterior surface (Fig. 134), its medial carina divided, forming a short, quadrate, medial area (Fig. 136); propodeal tubercle absent; pterostigma slender, proximal part concave posteriorly; r 1 distinctly longer than width of pterostigma (Fig. 137); parastigma small; subdiscoideus almost straight; 1st discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 1 : 5; metacarp not distinctly surpassing radial cell; length of hind femur 7.0 times its width; hind coxa almost smooth; fore and middle claws of ♀ with rather short, blackish bristles, hind claw simple; length of ovipositor sheath 0.11 times fore wing; ovipositor straight; hypopygium medium-sized; metasoma compressed in apical half.

Distribution. — Palaearctic: one species.

Note. *Contochorus* has much in common with *Leioblacus*, but essential differences are the following apomorphous characters of *Contochorus*: 1 — ovipositor short; 2 — medial area of propodeum short, quadrate; 3 — dorsal surface of propodeum relatively long; 4 — blackish bristles of fore and middle claws of ♀; 5 — malar suture present; 6 — eye setose.

Both subgenera have the following apomorphous characters in common: 1 — precoxal suture more or less smooth; 2 — pterostigma slender, with proximal inner side concave; 3 — compressed and slender metasoma.

Blacus (Contochorus) glabrum spec. nov. (Fig. 134—140)

Holotype, ♀, length of body 1.3, length of fore wing 1.5 mm.

Head. — Antennal segments 17 (as in 4 paratypes, 16 in ♂ paratype), length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.5 and 3.7 times their width, respectively, length of penultimate segments 1.2 and 1.5 times their width; dorsal length of eye 1.1 times length of temple (Fig. 140); POL : Ø ocellus : OOL = 4 : 2 : 5; area in front of occipital carina finely crenulate; apical margin of clypeus straight medially.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum smooth, except for two longitudinal carinae in basal half and some shallow depressions (Fig. 134); zone behind prepectal carina finely crenulate; mesoscutal lobes moderately convex; dorsal surface of propodeum superficially rugose.

Wings. — Nervulus and nervellus short; length of r 1 about 1.5 times width of pterostigma.

Legs. — Length of femur, tibia and basitarsus of hind leg 7.0, 11.2 and 6.5 times their width, respectively.

Metasoma. — Length of 1st tergite 2.6 times its apical width, surface superficially rugose, dorsal carinae distinct in whole length, spiracle protruding (Fig. 136).

Colour. — Brown; part of clypeus, labrum, mandible and metasoma baso-ventrally, yellowish; pterostigma, 2nd and 3rd metasomal tergites, tegulae and base of antenna more brown; legs yellowish but hind femur and tibia brownish except for their bases.

Holotype ♀ in BM, London: "Taplejung Distr., Sangu, c 6200′. Mixed vegetation by stream in gully, ix-x.1961", "Brit. Mus. East Nepal Exp., 1961-1962, R. L. Coe Coll. B.M. 1962-177". Paratypes: 1 ♀, topotypic (AC); 2 ♂, one the allotype, by stream in shady ravine, below Sangu, 30.x.1961, further as holotype labels (BM, AC) (parastigma enlarged); 2 ♀, topotypic, ca. 6000′ (by stream in shady ravine, 30.x.1961) and ca. 6800′ (mixed vegetation in dried-up ravine, 16.ii.1962) (BM); 1 ♀, "Arun Valley: East shore of R. Arun below Tumlingtar, c 1800′, 14-23.xii.1961", "Evergreen shrubs bordering dry stream-beds" (AC).

Ganychorus Haliday, subgenus
(Fig. 1—8, 10, 11, 141—248)

Haliday, 1835, Ent. Mag. 3: 39—40.

Type-species: *Bracon ruficornis* Nees.

Diagnosis. — Length of body 1.8—4.5, length of fore wing 1.7—4.5 mm; antenna segments of ♀ 15—25, but usually 19—21; eye usually bare, but sometimes with a few setae or distinctly setose; occipital carina complete, usually strongly developed; clypeus smooth, sometimes with some lateral irregularities (in *dilaticornis*), its apical margin straight medially; frons and vertex smooth or finely striate; face smooth, at most superficially rugose; length of malar space 1.1—2.5 times basal width of mandible; malar suture absent or present; precoxal suture present, with closely spaced striae (Fig. 156) or with widely spaced crenulae (Fig. 149) or a combination of both (Fig. 197); metapleural flange distinct, sharp or blunt, medium-sized to large; notauli complete, more or less deep; scutellar suture wide, deep, with one distinct longitudinal carina in all Nearctic and Neotropical species; scutellum smooth or transversely rugose (Fig. 152),

its lateral carina well developed, complete, often lamelliform, more or less protruding apically in several species; side of scutellum rugose, seldom more reticulate; parastigma small or enlarged (Fig. 170), the latter especially in ♂; 1st discoidal cell truncate anteriorly, or sharp or even petiolate; d 1 : d 2 = 1 : 1.0—3.4; metacarp not distinctly surpassing radial cell; r 2 straight or nearly so, only in *strictus* bent; length of hind femur 5.2—8.5 times its width; hind coxa rugose dorsally or almost smooth; fore claw of ♀ always and middle claw often and hind claw seldom with blackish bristles and teeth (Fig. 229); propodeal tubercle usually absent, if present then small (Fig. 141); propodeal carinae at least dorsally distinctly developed; medial carina of propodeum undivided, seldom divided, then on posterior surface a narrow area (Fig. 155); ovipositor straight or slightly bent, only in *strictus* bent dorsad; length of ovipositor sheath 0.14—0.21 times for wing; metasoma after 1st tergite smooth or superficially microsculptured; hypopygium small.

Distribution. — Holarctic: two species; Palaearctic: 15 species; Nearctic: three species; Neotropical: three species (and one species in both Nearctic and Neotropical regions); Ethiopian: four species; Oriental: one species.

Note. Important apomorphous characters are: 1 — lateral carina of scutellum complete, often lamelliform; 2 — fore (and often middle) claw of ♀ with blackish bristles and teeth; 3 — medial carina of propodeum undivided, seldom divided and forming a narrow area; 4 — 2nd metasomal tergite smooth or nearly so; 5 — ovipositor short.

Key to Nearctic and Neotropical species of the subgenus *Ganychorus*

1. Propodeal tubercle small, but distinct (Fig. 141). (Apex of tibia and base of hind leg infuscated; head narrowed ventrad (Fig. 145); length of 1st metasomal tergite 1.4—1.6 times its apical width; discoidal cell (sub-)petiolate, sharp anteriorly; lateral carina of scutellum somewhat protruding (Fig. 141)) . . . . . *cracentis* spec. nov.[1]) (p. 201)
— Propodeal tubercle absent, sometimes carinae somewhat protruding 2
2. Medial carina of propodeum divided apically, forming a rather narrow 3rd area on posterior surface of propodeum (Fig. 155); apical half of hind femur more or less brown; 1st metasomal tergite 2.2 times its apical width (Fig. 155); antennal segments of ♀ 23—24, of ♂ 22 . . . . . *fissus* spec. nov. (p. 202)
— Medial carina of propodeum undivided, posterior surface of propodeum with 2 large areas, some specimens of *ruficornis* may have the medial carina rather weakly developed, being part of a more or less reticulate area on posterior surface of propodeum, but these specimens have usually 20, seldom 19 or 21 antennal segments; 1st metasomal tergite 1.4—1.8 times its apical width; hind leg yellow 3
3. Hind femur and tibia equally yellowish; antenna rather slender (Fig. 156); wings normally developed 4
— Hind femur and/or tibia more or less darkened, brownish; antenna and wings variable 5
4. Length of 1st metasomal tergite of ♀ 1.4—1.8 times its apical width, distinctly widened apicad (Fig. 161); malar space slightly longer than base of mandible;

[1]) Males with distinct propodeal tubercle and scutellum superficially reticulate, see subgenus *Hysterobolus*.

lateral carina of scutellum slightly protruding (Fig. 156); pterostigma of ♂ enlarged (Fig. 170) . . . . . *ruficornis* (Nees) (p. 203)

— Length of 1st tergite of ♀ 2.2 times its apical width, sides parallel apicad (Fig. 169); lateral carina of scutellum distinctly protruding (Fig. 163); length of malar space 2.5 times base of mandible; ♂ unknown . . . . . *armatulus* Ruthe (p. 204)

5. Mesosoma red; hind femur completely dark brown; length of hind tibia 13.3 times its width; length of 3rd antennal segment 5.8 times its width (Fig. 176); length of 1st tergite 2.1 times its apical width (Fig. 181) . *thoracicus* spec. nov. (p. 205)

— Mesosoma yellowish, brown or blackish; hind femur partly yellowish, seldom completely infuscated; length of hind tibia 9.0—10.0 times its width; length of 3rd antennal segment 3.3—4.2 times its width (Fig. 199, 213); length of 1st tergite 1.3—2.5 times its apical width (Fig. 188, 205) 6

6. Antenna strongly dilated medially, width of 11th segment twice width of 3rd segment (Fig. 182), apex yellowish; length of 1st metasomal tergite 2.5 times its apical width (Fig. 188) . . . . . *dilaticornis* spec. nov. (p. 206)

— Antenna not or scarcely dilated medially (Fig. 213), apex darkened or yellowish; length of 1st tergite 1.3—2.1 times its apical width (Fig. 191, 205, 219) . . . 7

7. Lateral carina of scutellum raised apically (Fig. 206, 213); length of 1st tergite 1.7—2.0 times its apical width, slightly widened apically (Fig. 219); hind femur submedially yellowish (Fig. 209, 217); usually penultimate segments of antenna of ♀ yellowish; micropterous form unknown 8

— Lateral carina not raised apically, or indistinctly (Fig. 197); length of 1st tergite 1.3—1.4 times its apical width, distinctly widened apically (Fig. 205); hind femur less darkened but medially not different from subapical region; penultimate segments of antenna of ♀ infuscated; micropterous form occurs (Fig. 189) . . . . . *striatus* spec. nov. (p. 207)

8. Dorsal length of eye 1.1 times length of temple (Fig. 212); eyes in frontal aspect less protruding (Fig. 208); length of ovipositor sheath 0.18—0.20 times fore wing; 2nd metasomal tergite reddish brown; parastigma of ♂ as ♀, not enlarged . . . . . *collaris* (Ashmead) (p. 208)

— Dorsal length of eye 1.4—1.6 times length of temple (Fig. 214); eyes in frontal aspect distinctly protruding (Fig. 216); length of ovipositor sheath 0.12—0.14 times fore wing; 2nd metasomal tergite yellowish; parastigma of ♂ enlarged as compared to ♀ . . . . . *epitolus* spec. nov. (p. 209)

Key to Ethiopean species of the subgenus *Ganychorus*

1. Malar space slightly longer than basal width of mandible; hind femur yellowish brown; 1st metasomal tergite slightly shorter than twice its apical width . . . . . *dracomontanus* Haeselbarth (p. 210)

— Length of malar space 1.7—2.0 times basal width of mandible; hind femur largely dark brown or yellowish brown; shape of 1st tergite usually different (Fig. 255, 248) 2

2. Subdiscoideus almost straight (Fig. 175), sometimes somewhat bent basally; notauli shallow, smooth; lateral carina of scutellum protruding apically; length of 1st metasomal tergite 2.2—2.4 times its apical width (Fig. 171) . . . . . *genalis* Haeselbarth (p. 210)

— Subdiscoideus distinctly bent proximally (Fig. 221, 244); notauli deep, crenulate basally; lateral carina of scutellum variable; length of 1st tergite 1.3—1.9 times its apical width (Fig. 225, 248) 3

3. Length of 1st tergite 1.3 times its apical width, distinctly dilated apicad (Fig. 225); lateral carina of scutellum not protruding apically (Fig. 220); length of ovipositor sheath 0.21 times fore wing; antenna less slender (Fig. 220) . . . . . *haeselbarthi* spec. nov. (p. 210)

— Length of 1st tergite 1.9 times its apical width, scarcely dilated apicad (Fig. 248); lateral carina of scutellum protruding apically (Fig. 242); length of ovipositor sheath 0.15 times fore wing; antenna relatively slender (Fig. 242) . . . . . *stami* spec. nov. (p. 215)

Key to Palaearctic species of the subgenus *Ganychorus* (modified after Haeselbarth, 1973a and 1973b)

1. Antennal segments of ♀ 15, of ♂ 16; ovipositor short, scarcely protruding behind metasoma, slightly bent upwards . . . . . *strictus* Stelfox (p. 211)

— Antennal segments of ♀ 17 or more, of ♂ 19 or more; ovipositor longer, distinctly protruding, slightly bent ventrad or straight 2

2. Propodeal tubercle present; antennal segments of ♀ 17—19; middle claw simple 3

— Propodeal tubercle absent; antennal segments of ♀ 19 or more; usually middle claw with blackish bristles 4

3. Scutellum smooth; antennal flagellum of equal width (Fig. 25 in Haeselbarth, 1973a); length of malar space almost twice basal width of mandible; antennal segments of ♀ 17 . . . . . *varius* Haeselbarth (p. 211)

— Scutellum superficially rugose; antennal flagellum more slender basally (Fig. 16 in Haeselbarth, 1973a); malar space almost 1.5 times basal width of mandible; antennal segments of ♀ 17—19 . . . . . *nixoni* Haeselbarth (p. 211)

4. First metasomal tergite scarcely widened apicad; antennal segments of ♀ 19—20; lateral carina of scutellum lamelliform, distinctly protruding apically 5

— First metasomal tergite distinctly widened apicad, especially in ♀ (but *apaches* rather is a borderline case); lateral carina of scutellum usually less protruding and lamelliform, or antennal segments of ♀ 23—25 6

5. Scutellum distinctly rugose; antennal segments of ♀ 20; length of malar space about 2.5 times basal width of mandible (Fig. 164); wings narrow (Fig. 165) . . . . . *armatulus* Ruthe (p. 204)

— Scutellum smooth or indistinctly rugose; antennal segments of ♀ 19, seldom 20; length of malar space somewhat shorter than twice basal width of mandible; wings wider (Fig. 31 in Haeselbarth, 1973a) . . . . . *tripudians* Haliday (p. 212)

6. Hind femur more or less dark brown or blackish subapically, scarcely defined; antennal segments of ♀ 20 7

— Hind femur brownish yellow, infuscated area wanting; antennal segments of ♀ 19—25 11

7. Length of 4th antennal segment about twice its width (Fig. 18 in Haeselbarth, 1973a); scutellum usually smooth; frons finely striate dorsally; propodeum almost cubical, in lateral aspect angle between dorsal and posterior surface 95—100°; fresh specimens blackish, even hind femur may be blackish . . . . . *maculipes* Wesmael (p. 212)

— Length of 4th antennal segment 2.5—3.0 times its width; scutellum and frons variable; angle between dorsal and posterior surface 105—120°; fresh specimens partly more or less brownish 8

8. Hind claw of ♀ with blackish bristles and teeth (Fig. 11 in Haeselbarth, 1973a); scutellum superficially transversely rugose; antennal flagellum of equal width (Fig. 17 in Haeselbarth, 1973a); nominate subspecies is micropterous, from Ireland only; subspec. *macropterus* Haeselbarth from Europe, except Ireland . . . . . *ambulans* Haliday (p. 212)

— Hind claw of ♀ without blackish bristles or teeth; scutellum and antenna variable 9

9. Scutellum rather distinctly rugose; frons distinctly and finely striate dorsally; antennal flagellum of ♀ of equal width (Fig. 19 in Haeselbarth, 1973a) . . . . . *koenigsmanni* Haeselbarth (p. 212)

— Scutellum smooth; frons smooth or indistinctly striate; antennal flagellum slightly widened apicad (Fig. 1 in Haeselbarth, 1973b) 10

10. Frons smooth; antenna somewhat shorter and less slender (Fig. 24 in Haeselbarth, 1973a); mesopleura less sculptured; usually macropterous . . . . . *diversicornis* (Nees) (p. 212)

— Frons indistinctly striate; antenna somewhat longer and more slender (Fig. 1 in Haeselbarth, 1973b); mesopleura almost completely and distinctly striate; usually micropterous . . . . . *kaszabi* Haeselbarth (p. 212)

11. Antennal segments of ♀ 23—25, of ♂ 25—26; length of fore wing 4.0—4.5 mm . . . . . *pallipes* Haliday (p. 213)

— Antennal segments of ♀ 19—20, of ♂ 20—23; length of fore wing seldom exceeding 3.0 mm 12

12. Antennal segments of ♀ 20; hind coxa usually completely yellowish; 1st discoidal cell relatively stout, somewhat wider than long (Fig. 32 and 35 in Haeselbarth, 1973a) 13

— Antennal segments of ♀ 19; hind coxa at least brownish dorsally; 1st discoidal cell relatively slender, somewhat longer than wide (Fig. 30, 34 in Haeselbarth, 1973a) 16

13. Middle claw simple; fresh specimens completely black; length of basal vein about 1.6 times length of cu 1 (Fig. 32 in Haeselbarth, 1973a); occipital carina distinctly arched; antenna slender (Fig. 20 in Haeselbarth, 1973a) . . . . . *nitidus* Haeselbarth (p. 213)

— Middle claw with blackish bristles and teeth; fresh specimens partly brownish; basal vein about 1.2—1.4 times length of cu 1 (Fig. 228); occipital carina relatively straight; antenna less slender 14

14. Length of 1st metasomal tergite 2.0—2.1 times its apical width, apical width distinctly less than twice its minimum width (Fig. 232); precoxal suture relatively remotely covered with rugae (Fig. 227) . . . . . *apaches* spec. nov. (p. 213)

— Length of 1st tergite 1.4—1.8 times its apical width, apical width twice its minimum width (Fig. 161); precoxal suture closely covered with fine rugae (Fig. 156) . 15

15. Hind claw with long, blackish bristles (Fig. 9 in Haeselbarth, 1973a); wing somewhat brownish; antenna somewhat more stout (Fig. 15 in Haeselbarth, 1973a); angle between dorsal and posterior surface of propodeum ca. 115—120° . . . . . *pectinatus* Haeselbarth (p. 214)

— Hind claw almost simple, at most with medium-sized, yellowish setae (Fig. 8 in

Haeselbarth, 1973a); wing almost hyaline; antenna somewhat more slender (Fig. 158); angle between dorsal and posterior surface of propodeum ca. 130° . . . . . *ruficornis* (Nees) (p. 203)

16. First discoidal cell sharp anteriorly (Fig. 30 in Haeselbarth, 1973a); rugae of precoxal suture distinct near prepectal carina; scutellum slightly convex; frontal suture indistinctly developed . . . . . *conformis* Wesmael (p. 214)

— First discoidal cell narrowly truncate anteriorly (Fig. 34 in Haeselbarth, 1973a); rugae of precoxal suture indistinct or absent near prepectal carina; scutellum moderately convex; frontal suture distinctly developed . . *capeki* Haeselbarth (p. 214)

Blacus (Ganychorus) cracentis spec. nov. (Fig. 141—148, 173, 174)

Holotype, ♀, length of body 2.0 mm (paratypes: 2.4—2.6 mm); length of fore wing 2.2 mm (paratypes: 2.5—3.0).

Head. — Antennal segments 19 (paratypes: 20) (Fig. 143), length of 3rd segment 1.6 times 4th segment (paratypes: 1.5—1.6 times), length of 3rd and 4th segments 5.7 and 4.0 times their width, respectively (paratypes 4.3—5.6 and 2.7—3.5 times, respectively), length of penultimate segments ca. 1.5 times their width; area in front of occipital carina narrowly crenulate; eye bare (in paratype with some setae); frontal suture indistinct (but distinct in paratypes); frons and vertex smooth; POL : Ø ocellus : OOL = 8 : 3 : 9; dorsal length of eye 0.8 times temple (Fig. 145); face smooth (but superficially rugose in paratypes); length of malar space 1.8 times basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.3 (paratypes: 1.4) times its height; side of pronotum reticulate, except for medio-dorsal two-fifths (Fig. 141); zone behind prepectal carina widely spaced crenulate; epicnemial suture almost smooth; precoxal suture with some short rugae (Fig. 141); metapleural flange blunt; notauli deep, narrowly crenulate anteriorly only (Fig. 146); mesoscutal lobes convex; scutellum almost smooth, its lateral carina lamelliform, somewhat protruding apically (Fig. 141); propodeal tubercle small, but distinct, rather blunt and situated low (Fig. 141); surface of propodeum almost smooth, except for undivided medial and both lateral carinae.

Wings. — First discoidal cell sharp, subpetiolate anteriorly (Fig. 144); d 1 : d 2 = 4 : 7 (—10 in paratypes); parastigma small.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 11.8 and 10.0 times their width, respectively (paratypes: 5.2—5.6, 10.4—11.0 and 9.0—10.0 times, respectively); fore tarsal claw with rather short, brownish bristles, which in two paratypes are blackish; middle and hind claws simple.

Metasoma. — Length of 1st tergite 1.6 (paratypes: 1.4—1.5) times its apical width, longitudinally rugose, dorsal carinae distinct in basal third (Fig. 147), spiracle flat; length of ovipositor sheath 0.17 times fore wing (3 paratypes measured: 0.10, 0.14, and 0.19 times, respectively).

Colour. — Blackish brown; metasoma after 1st tergite and basal half of antenna, yellowish brown; base of pterostigma and parastigma, whitish; mandible, tegulae, palpi and legs, brownish yellow; apex of femur, telotarsi and base of tibia of hind leg infuscated (Fig. 148).

Holotype ♀ in CNC, Ottawa: "Mex. Sin. 4½ mi. W. El Palmito, 6500 ft., 4 Aug. 1964, W. R. M. Mason." Paratypes: 6 ♀, "Mex. Dgo. 9000 ft. El Salto, 10 mi. W.,

15 July (1 ♀) and 9 June 1964 (3 ♀) W. R. M. Mason" "Mex., Chis., 7000 ft., 20 mi. N. Bochil, Y. Buena, Cloudfor., Mason, 10 June 1969" (2 ♀). One of the latter has scutellum rugose (CNC, AC), most paratypes larger, more robust specimens, e.g. antenna (Fig. 143), head (Fig. 174) and 1st metasomal tergite (Fig. 173).

Note. Rather variable species, well characterized by lateral carina of scutellum, propodeal tubercles, sharp discoidal cell and colour of hind leg. Closely related to *nixoni*, but *cracentis* has different: colour of hind leg, shape of head anteriorly (Fig. 27 in Haeselbarth, 1973a versus my Fig. 142), antenna relatively longer (length 1.2 times length of body and in examined paratype of *nixoni* 0.8 times) and pterostigma more slender (Fig. 37 in Haeselbarth, 1973a versus my Fig. 144).

Blacus (Ganychorus) fissus spec. nov. (Fig. 149—155)

Holotype, ♀ length of body 2.3, length of fore wing 2.5 mm.

Head. — Antennal segments 24 (23 in paratype), length of 3rd segment 1.8 times 4th segment; length of 3rd and 4th segments 6.0 and 3.3 times their width, respectively, length of penultimate segments 1.7—1.8 times their width; area in front of occipital carina narrowly crenulate; eye bare; frontal suture shallow; frons and vertex smooth; POL : Ø ocellus : OOL = 9 : 5 : 11; dorsal length of eye 1.1 times length of temple (Fig. 153); face smooth; length of malar space 1.2 times base of mandible; malar suture shallow.

Mesosoma. — Length of mesosoma 1.2 times its height; side of pronotum reticulate, except for dorsal two-fifths; zone behind prepectal carina smooth except for some short crenulae; epicnemial suture rather superficially crenulate; precoxal suture with widely spaced crenulae (Fig. 149), mainly in middle part; metapleural flange sharp, distinct; notauli deep and wide, completely crenulate (Fig. 152); mesoscutal lobes rather convex; scutellum transversely rugose, its lateral carina lamelliform, protruding apically; propodeal tubercles absent; propodeum dorsally almost smooth, except for medial and both lateral carinae, its posterior surface widely spaced reticulate, with medial carina divided, medial area relatively narrow dorsally (Fig. 155).

Wings. — First discoidal cell truncate anteriorly; d 1 : d 2 = 4 : 11; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.8, 11.4 and 9.3 times their width, respectively; fore and middle claws with large, blackish bristles; hind claw simple.

Metasoma. — Length of 1st tergite 2.3 times its apical width, superficially reticulato-rugose, dorsal carinae distinct in whole length, about parallel (Fig. 155), spiracle flat; length of ovipositor sheath 0.16 times fore wing.

Colour. — Reddish brown; stemmaticum with black patch; antenna, palpi, face, clypeus, mandible, apical half of 2nd metasomal tergite, metasoma ventrobasally and tegulae, more or less yellowish; pterostigma, brown; legs, yellowish but telotarsi, apical half of hind femur and hind tibia largely, brown (but in paratype hind femur yellowish and hind tibia infuscated only).

Holotype ♀ in BM, London: "Brazil, Nova Teutonia, 27°B, 52—58°L, 25.iii.1938, Fritz Plaumann, B.M. 1938-458". Paratypes: 1 ♀, topotypic, 19.v.1938 (AC) and 1 ♂, allotype, topotypic, 7.vi.1938 (BM) (antennal segments 22).

Note. Closely related to *epitolus* but frontal aspect of head short by shorter malar space (length in *fissus* 1.2 times versus 2.0 times basal width of mandible in *epitolus*),

notauli wider and more distinctly crenulate (Fig. 152 versus Fig. 218), antenna of ♀ with more segments (23—24 versus 20) and medial carina of propodeum divided. By the latter character, its transverse head and wide notauli, it comes rather close to *Tarpheion*. The relationship between the two subgenera is indicated in Fig. 21.

Blacus (Ganychorus) ruficornis (Nees) (Fig. 156—162, 170)

Nees von Esenbeck, (1811) 1812, Mag. Ges. nat. Fr. Berl. 5: 18, Fig. (as *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23—24.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 97—99, Fig. 3, 7, 8, 14, 35, 96, 105, 113.
Say, 1836, Boston J. nat. Hist. 1 (3) : 264 (*Microgaster bisstigmata*). Syn. nov.
Hellén, 1958, Fauna Fennica 4: 21 (*Blacus dentatus*).

Description of female. Length of body 2.2—2.6, length of fore wing 2.3—2.7 mm.

Head. — Antennal segments 20 (98.5 % of 182 ♀ counted, 1 % has 21 and 0.5 % has 19), length of 3rd segment 1.3—1.4 times 4th segment, length of 3rd and 4th segments 4.0—5.2 and 3.3—3.8 times their width, respectively, penultimate segments somewhat longer than wide (Fig. 156); area in front of occipital carina crenulate; eye with some short setae, almost bare; frontal suture shallow; frons and vertex smooth; POL : Ø ocellus : OOL = 11 : 3 : 12 (in figured specimen); dorsal length of eye about equal to temple or slightly shorter (Fig. 162); face smooth; malar space slightly longer than basal width of mandible; malar suture usually absent, but in some specimens distinct.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulato-rugose (Fig. 156); zone behind prepectal carina indistinctly crenulate; epicnemial suture superficially micro-striate; precoxal suture superficially micro-striate (Fig. 156), sometimes more rugose or almost smooth; metapleural flange medium-sized, truncate; notauli narrow, anteriorly crenulate, posteriorly rugose (Fig. 160); mesoscutal lobes more or less convex; scutellum smooth, except for some indistinct rugae (Fig. 160), its lateral carina distinct, slightly protruding or rather flat apically (Fig. 156); propodeal tubercle absent; dorsal surface of propodeum superficially rugose, besides having the medial and both lateral carinae, its posterior surface reticulato-rugose, medial carina usually undivided (Fig. 161), but seldom divided and forming a narrow medial area.

Wings. — First discoidal cell more or less narrowly truncate anteriorly (Fig. 158); d 1 : d 2 = 1 : 1.6—2.3; parastigma large (Fig. 158).

Legs. — Length of femur, tibia and basitarsus of hind leg 6.0—7.0, 9.0—11.2 and 9.0—11.0 times their width, respectively; fore and middle tarsal claws with large, blackish bristles; hind claw with small, brownish bristles.

Metasoma. — Length of 1st tergite 1.4—1.8 times its apical width, superficially striato-rugose, dorsal carinae distinct in basal two-fifths, spiracle slightly protruding (Fig. 161); length of ovipositor sheath 0.18—0.20 times fore wing, about as long as 1st tergite (according to Haeselbarth, 1973a, European specimens have ovipositor sheath ca. 1.2 times 1st tergite, but see notes).

Colour. — More or less reddish brown; mandible, palpi, basal half of antenna, tegulae, legs and base of pterostigma, yellowish.

Figured specimen: "Val Marie, Sask., 49°15′, 107°44′, 10.vi.1955, J. R. Vockeroth" (CNC).

Male. — Easily recognizable by enlarged parastigma (Fig. 170); antennal segments 21, of 94.8 % of 114 ♂ counted, 2.6 % have 20 and 2.6 % have 22.

Nearctic specimens examined from: Alaska, Northwest Territories, Yukon Territory, Saskatchewan, British Columbia, Manitoba, Alberta, Ontario, Quebec, Nova Scotia, South Dakota, Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, New York, Maryland, Virginia, North Carolina, Tennessee, Georgia, Louisiana, Washington, Idaho, California, Arizona, Colorado, Texas, and Mexico (5000—9000 ft).

Notes. Common species, swarms (2 ♀ and 9 ♂ specimens examined in SC: "Swarm, Late Sunl., Red Clover field" from Trout Lake, Wis., 20.xx.1918) and is frequently captured at light.

As to be expected, a species with as wide a distribution as *ruficornis* is rather variable, especially in colour and sculpture. European specimens examined are not distinctly different and in my opinion Nearctic specimens also do not form a subspecies. The usually smooth face and the somewhat wider discoidal cell are not a sound base for erecting a subspecies. Also the ovipositor sheath may be somewhat shorter as compared to the 1st tergite, but in examined specimens from München (W. Germany), Wijster (Drente) and Melissant (Zuid-Holland) (both Netherlands) the length of the sheath is 0.17—0.19 times fore wing and 1.0—1.1 times 1st tergite.

The type of *Microgaster bisstigmata* Say, 1836, from Indiana is lost, the short description makes it certain that Muesebeck's view is correct. In USNM male specimens of *ruficornis* (under *bisstigmata*) have a double pterostigma due to the large parastigma.

This is the most common species of the genus in the Netherlands. Specimens examined from: Asperen, Waarder, Meijendel, Melissant (at light) and Oostvoorne (all Zuid-Holland); Haamstede (Zeeland); Putten and Ede (Gelderland); Wijster (Drente) and Schweibergerbos (Zuid-Limburg). Also from Poland, Mirków, nr. Wroclaw. Snellen van Vollenhoven (1873 and 1876) mentioned Driebergen, Amersfoort (both Utrecht) and Waalsdorp (Zuid-Holland).

Additionally I have examined a vividly coloured ♀ from Nepal: "deep river gorge, c. 5200′", "Taplejung Distr.: between Sangu and Tamrang, x-xi.1961" (BM).

Blacus (Ganychorus) armatulus Ruthe (Fig. 163—169)

Ruthe, 1861, Berl. ent. Z. 5: 137.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 16—17.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 111—112, Fig. 22—26.

Described and figured after a ♀ from Innisville. Length of body 2.1, of fore wing 1.9 mm.

Head. — Antennal segments 20, length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 3.8 and 2.7 times their width, respectively, penultimate segments slightly longer than wide; area in front of occipital carina distinctly crenulate; eye bare; frontal suture absent; frons almost smooth, but vertex near posterior ocelli superficially micro-sculptured (Fig. 166); POL : Ø ocellus : OOL = 7 : 3 : 9; dorsal length of eye equal to temple (Fig. 166); face superficially rugose; malar space 2.5 times basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.3 (1.4 with lateral carina of scutellum) times its height; side of pronotum reticulate (Fig. 163); zone behind prepectal carina crenulate; epicnemial suture striato-rugose as area posterior of it (Fig. 163); precoxal suture rather irregularly striato-rugose, as surroundings; metapleural flange distinct; notauli indistinctly crenulate, rather narrow (Fig. 168); mesoscutal lobes slightly convex, scutellum superficially rugose (Fig. 168), its lateral carina lamelliform, distinctly protruding apically;

propodeal tubercle absent, but carinae somewhat protruding; dorsal surface of propodeum superficially rugose, medial carina undivided, posterior surface spaced reticulate.

Wings. — First discoidal cell narrowly truncate anteriorly, almost sharp; d 1 : d 2 = 7 : 16; parastigma rather small.

Legs. — Length of femur, tibia and basitarsus 6.8, 8.8 and 8.2 times their width, respectively; fore and middle claws with dark bristles; hind claw simple.

Metasoma. — Length of 1st tergite 2.2 times its apical width (2.0 times in specimen from Chatterton), reticulato-rugose, dorsal carinae strong in basal half, confluent at height of spiracles (Fig. 169), spiracle slightly protruding; length of ovipositor sheath 0.19 times fore wing (0.15 times in specimen from Chatterton).

Colour. — Dark brown; pterostigma, 2nd and base of 3rd metasomal tergite, brownish yellow; pronotum, reddish brown; basal half of antenna, mandible, palpi, tegulae and legs (except telotarsi), yellowish.

Examined specimens: "Innisville, Ont., 16.vii.1963, W. R. M. Mason" (CNC), "Chatterton, Ont., 13 mi. N. Belleville, meadow, 11.viii.1969" (AC) and "Ocsa, Turjani-erdö, 1952.x.30, leg. Kaszab". (det. Haeselbarth, 1972, HC).

Notes. The Hungarian specimen has the ovipositor sheath somewhat shorter (length 0.16 times fore wing), hind femur somewhat more brownish yellow and metasoma, except 1st tergite, brownish yellow. This species is not known from the Netherlands.

May be confused with *collaris*, but *armatulus* has a longer face (Fig. 164 versus Fig. 208), an apically less dilated 1st tergite (Fig. 169 versus Fig. 211), a less convex mesoscutum and a superficially rugose scutellum with the carina more protruding apically (Fig. 164 versus Fig. 206).

Blacus (Ganychorus) thoracicus spec. nov. (Fig. 172, 176—181)

Holotype, ♀, length of body and of fore wing 3.7 mm.

Head. — Antennal segments 21 (as in all paratypes), length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 5.8 and 4.8 times their width, respectively, length of penultimate segments twice their width; area in front of occipital carina distinctly crenulate; eye with some setae; frontal suture shallow; frons and vertex smooth; POL : Ø ocellus : OOL = 4 : 3 : 8; dorsal length of eye 1.1 times temple (Fig. 180); face smooth, except for some indistinct rugae; length of malar space nearly twice basal width of mandible; malar suture absent but near eye shallowly depressed (Fig. 179).

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulato-rugose except for small dorsal area (Fig. 176); zone behind prepectal carina crenulate; epicnemial suture smooth, except for some indistinct rugae; precoxal suture rather superficial, rugose (Fig. 176); metapleural flange large; notauli completely crenulate, moderately wide; mesoscutal lobes rather convex; scutellum smooth but with some lateral rugae (Fig. 178), its lateral carina complete, lamelliform, somewhat protruding posteriorly (Fig. 176); propodeal tubercle absent; dorsal surface of propodeum smooth except for the undivided medial and both lateral carinae, its posterior surface areolate (Fig. 181), almost smooth between the carinae.

Wings. — First discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 5 : 17; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 8.5, 13.3 and 11.6 times

their width, respectively; fore and middle claws with black bristles and teeth; hind claw simple.

Metasoma. — Length of 1st tergite 2.1 times its apical width, reticulato-rugose (Fig. 181), dorsal carinae distinct in basal fifth, spiracle slightly protruding; length of ovipositor sheath 0.17 times fore wing.

Colour. — Brown; mesosoma, red; tarsi and antenna (except for scapus and apical segments), yellowish.

Holotype ♀ in CNC, Ottawa: "Mex., Dgo. 14 mi. SW. El Salto, 8000′ [ft], 26 June 1964, W. R. M. Mason". Paratypes: 6 ♀, all from Mexico, topotypic: 26.vi.1964 (2 ♀) and 30.vi.1964 (2 ♀); Dgo., 24.mi.W. La Cuidad, 7000 ft, 4.viii.1964; Chis., 7000 ft, 20 mi. N. Bochil, Y. Buena, Cloudfor., Mason, 10.vi.1969 (CNC, AC).

Note. Near the Palaearctic *tripudians,* but *tripudians* usually has 19 antennal segments, antenna and wings less slender (cf. Fig. 13 and 31 in Haeselbarth, 1973a), 1st discoidal cell narrower, and mesosoma blackish brown.

Blacus (Ganychorus) dilaticornis spec. nov. (Fig. 182—188)

Holotype, ♀, length of body and of fore wing 2.2 mm.

Head. — Antennal segments 20, length of 3rd segment 1.7 times 4th segment, length of 3rd and 4th segments 5.0 and 3.0 times their width, respectively, dilated mediad to twice width of 3rd segment (Fig. 182), length of penultimate segments ca. 1.5 times their width; area in front of occipital carina narrowly crenulate; eye distinctly setose; frontal suture absent; frons and vertex smooth; POL : Ø ocellus : OOL = 6 : 4 : 7; dorsal length of eye 1.2 times temple (Fig. 186); face laterally superficially rugose, with small elevation near protruding sockets of antenna; length of malar space somewhat more than basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulato-rugose except for dorso-apical corner (Fig. 182); zone behind prepectal carina superficially crenulate; epicnemial suture superficially rugose; precoxal suture superficially crenulate (Fig. 182); metapleural flange large; notauli distinctly crenulate, rather wide (Fig. 187); mesoscutal lobes rather flat; scutellum smooth, with some lateral rugae, its lateral carina lamelliform, protruding apically (Fig. 182); propodeal tubercle absent; surface almost smooth (Fig. 188), except for undivided medial and both lateral carinae.

Wings. — First discoidal cell truncate anteriorly; d 1 : d 2 = 11 : 15; parastigma medium-sized.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.3, 10.8 and 8.0 times their width, respectively; fore and middle claws with blackish bristles; hind claw simple.

Metasoma. — Length of 1st tergite 2.5 times its apical width, surface remotely covered with rugae (Fig. 188), dorsal carinae complete, distinctly developed, spiracle scarcely protruding; length of ovipositor sheath 0.17 times fore wing.

Colour. — Reddish brown; tegulae, palpi, clypeus, mandible, maxilla and legs, yellowish, but hind femur (except base), brown, and apex of hind tibia somewhat darkened; antenna, yellowish with segments 6—14, brown.

Holotype in BM, London: "Brasilien Nova Teutonia 27°11′B, 52°23′L, Fritz Plaumann, x.1935", "Brit. Mus. 1937-47". Paratype: "Brazil, Nova Teutonia, 27°B, 52—53°L, 7.vi.1938, Fritz Plaumann" (AC), ♀, antennal segments 20.

Blacus (Ganychorus) striatus spec. nov. (Fig. 189—194, 197—205)

Holotype, ♀, length of body 2.2, length of fore wing 2.0 mm.

Head. — Antennal segments 20 (one paratype: 21), length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 3.3 and 2.7 times their width, respectively, penultimate segments a quarter longer than wide; area in front of occipital carina finely crenulate; eye with some setae; frontal suture shallow; frons and vertex smooth; POL : Ø ocellus : OOL = 8 : 3 : 11; dorsal length of eye 1.1. times temples (Fig. 201), face smooth (but in paratypes sometimes micro-striate); length of malar space ca. twice basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.2 times its height; side of pronotum rugoso-striate; precoxal suture with some rugae, with micro-striae between, as surroundings (Fig. 197); metapleural flange large and blunt; notauli with spaced crenulae, narrow; mesoscutal lobes slightly convex; scutellum almost smooth, its lateral carina medium-sized, not protruding apically (but slightly raised in some paratypes); propodeal tubercle absent; surface of propodeum reticulato-rugose, with undivided medial and both lateral carinae rather indistinctly developed (Fig. 205).

Wings. — First discoidal cell sharp, sub-petiolate (but in some paratypes narrowly truncate) anteriorly; d 1 : d 2 = 3 : 7; parastigma medium-sized.

Legs. — Length of femur, tibia and of basitarsus of hind leg 5.2, 9.0 and 7.5 times their width, respectively; fore and middle claws with long, blackish, tooth-shaped, bristles; hind claw simple.

Metasoma. — Length of 1st tergite 1.4 times its apical width, surface striato-rugose, dorsal carinae distinct in basal fifth (in one paratype basal two-thirds), spiracle flat (Fig. 205); length of ovipositor sheath 0.20 times fore wing.

Colour. — Blackish brown; basal half of antenna (in paratypes often more), labrum, mandible, clypeus apically, head and mesonotum partially, metasoma after 1st tergite, brownish or reddish yellow; palpi, tegulae and parastigma, yellowish; pterostigma, brown; legs, brownish yellow but base of hind coxa, hind femur (except base and apex) and telotarsus, brown.

Holotype ♀ in CNC, Ottawa: "Barwick, N.S., March 1952, P. Hutchinson", "ground under apple". Paratypes: topotypic, 4 ♀, three of which are micropterous, March 1952 (3 ♀) and April 10, 1952 (1 ♀) (CNC, AC); Alaska, Kotzebue, 420, 14.viii.1958, Lindroth, 5 ♀, one of which is micropterous (CNC, AC); Aklavik, Nortwest Territory, 12.vi.1956, R. E. Leech (AC); id., 4.vi.1956, E. F. Cashman (CNC); King Salmon, Naknek R., Alaska, 11.vii.1952, J. B. Hartley (CNC); Hudson Bay, Saskatoon, 15.ix. 1959, J. R. Vockeroth (AC); McMurray, Alberta, 4.viii.1953, G. E. Ball (CNC); Summit Lake, British Columbia, mi 392 Alaska Hwy, 16.vii.1959, 4600′, R. E. Leech (CNC, micropterous); Ontario, Chatterton, 13 mi N. Belville, meadow, C. D. Dondale, 6 ♀, three of which are micropterous, 14 and 17.vii.1967, 9.iv.1968 and 14.vii.1969 (CNC, AC, HC); Canada, Upper Liard R. (Hwy bridge), Yukon Territory 303, 21.vi. 1958, Lindroth (CNC); British Columbia, Liard R., Hot Springs, 1725 ft, 24.viii.1962, P. J. Skitsko (AC); Moosilauke, 4310 ft, New Hampshire 6190 (USNM); Swan River, Manitoba, July 9, 1974, H. G. Wylie (micropterous, CNC) (all ♀).

Male. From Catterton (Ont.) and Island Falls (Ont.); length of fore wing distinctly or somewhat shorter than body (Fig. 203); 21 antennal segments.

Notes. Data of capture indicate the hibernation of the adults.

Micropterous specimens occur frequently (Fig. 189—194) and have the length of the mesosoma 1.3 times its height; length of ovipositor sheath 0.4—0.5 times hind femur (as in macropterous form) and 0.31 times fore wing.

Close to *diversicornis* and *ruficornis,* but *striatus* usually has mesopleura striate to a larger extent, discoidal cell sharp and subpetiolate (difference especially clear in ♂ (Fig. 203 versus 170), mesoscutum more slender (Fig. 202, 160), malar space longer, metasoma usually yellowish, and hind tibia brown.

Blacus (Ganychorus) collaris (Ashmead) (Fig. 206—212)

Ashmead, 1894, J. Linn. Soc. 25: 131 (as *Ganychorus*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.

Holotype, ♀, length of body 1.8 mm (other specimens 1.9—2.6 mm), length of fore wing 1.7 mm (1.8—2.4 in other specimens).

Head. — Antennal segments 20, length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments (4.2—) 5.0 and (3.0—) 3.5 times their width, respectively, length of penultimate segments somewhat less than 1.5 times their width; area in front of occipital carina distinctly crenulate; eye bare; frontal suture shallow; frons smooth, but vertex somewhat superficially rugose near ocelli (Fig. 212); POL : Ø ocellus : OOL = 10 : 4 : 12; dorsal length of eye 1.1 times temple (Fig. 212); face superficially rugose (but in some specimens smooth); length of malar space ca. twice basal width of mandible; malar suture absent (but present in specimen from Mexico).

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulato-rugose, except for dorsal third; zone behind prepectal carina indistinctly crenulate (but distinct in other specimens); epicnemial suture rugoso-striate, rather smooth in holotype; precoxal suture striate (in figured specimen also surroundings, Fig. 206); metapleural flange blunt, distinct; notauli with spaced crenulae, medium-sized; mesoscutal lobes rather convex; scutellum smooth (but superficially rugose in some specimens), its lateral carina lamelliform, protruding apically; propodeal tubercle absent; surface of propodeum superficially rugose, undivided medial and both lateral carinae strongly developed (Fig. 211).

Wings. — First discoidal cell truncate anteriorly (in some specimens sharp or nearly so); d 1 : d 2 = 5 : 10; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.0 (—6.5), 10.8 (9.2) and (in figured specimen) 9.0 times their width, respectively (hind basitarsus lost in holotype); fore and middle claws of examined specimens (fore claw of holotype lost) with large blackish bristles; hind claw with shorter, brownish setae.

Metasoma. — Length of 1st tergite 1.9 times its apical width (other specimens 1.7—2.0 times), surface superficially striato-rugose, dorsal carinae rather weakly developed, but distinct in basal nine-tenths, spiracle slightly protruding; ovipositor sheath 0.18 times fore wing (0.19 times in other specimens).

Colour. — Brownish; palpi, tegulae, mandible, antenna largely, and base of metasoma, more or less yellowish; legs brownish yellow but especially in hind leg coxa and femur basally (but indistinct in holotype), femur and tibia apically and telotarsus, brown.

Holotype in BM, London: "Type, H.T.", "B.M., Type Hym. 3.c.664", "*Ganychorus*

collaris Ashm., type, unique", "W. Indies 99-331", "March", "500 feet", "St. Vincent H. H. Smith".

Male. Parastigma as ♀, not enlarged as in *epitolus* and *ruficornis*, also head less transverse than *epitolus*, antennal segments 21.

Examined ♀ specimens: Parke Reserve, Kam. Co., Quebec, 950′ (ft), 18.viii.1957, W. R. M. Mason (specimen figured); Blacksburg, Virginia, 2100′, 27.v.(19)62, J. G. Chillcott; Hull, Quebec, 3 Aug. (19)65, Malaise trap; Mt. Mitchell, 6800′, North Carolina, 12.viii.1957, J. G. Chillcott; Mexico, Dgo., 9000′, El Salto, 10 m.W., 29 June 1964, W. R. M. Mason, robust and darker specimen with malar space somewhat shorter, malar suture distinct; 9 ♀ Brazil, Nova Teutonia, 7.v.1938, 1.xii.1938, 30.v.1938, 12.iii. 1936 and 19.v.1938; iii.1957; v. 1971, vii.1971 (2 ×); from the same locality 2 ♂, 4.xii. and 19.iv.1938; 1 ♀ from Colombia (Choco, 1000 m., 7—8.iv.1973, 5°45′N 16°30′W, J. Helava, CNC) and Argentina (Horco Molle, Tucuman, vi.1968, C. C. Porter, CNC). I was unable to separate the Neotropical specimens from the Nearctic material, although they are somewhat less sculptured.

Note. Related to *ambulans*, *armatulus* and *tripudians*, but *collaris* differs from *ambulans* by the protruding lateral carina of the scutellum apically and by the hind claw without blackish bristles (at most with shorter, brownish bristles). Differs from *armatulus* by shorter malar space (Fig. 164 versus Fig. 208) and apical two-fifths of hind femur, which is less darkened. Compared to *tripudians, collaris* has hind femur darkened and length of 1st tergite 1.7—2.0 (versus 2.4—2.5 in *tripudians*) times its apical width.

Blacus (Ganychorus) epitolus spec. nov. (Fig. 213—219)

Holotype, ♀, length of body 2.3, length of fore wing 2.1 mm.

Head. — Antennal segments 20, length of 3rd segment 1.3 times 4th segment; length of 3rd and 4th segments 4.7 and 3.7 times their width, respectively, length of penultimate segments ca. 1.5 times their width; area in front of occipital carina finely crenulate; eye almost bare, except for some setae, (eye distinctly more protruding than in *collaris* (Fig. 212, 214)); frontal suture absent; frons and vertex smooth; POL : Ø ocellus : OOL = 8 : 3 : 10; dorsal length of eye 1.6 times temple; face smooth; length of malar space twice basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulate except for medio-dorsal area (Fig. 213); zone behind prepectal carina relatively widely crenulate; epicnemial suture smooth; precoxal suture crenulate medially; metapleural flange distinct; notauli rather indistinctly crenulate, narrow; mesoscutal lobes moderately convex; scutellum smooth, except for some indistinct rugae, its lateral carina lamelliform, protruding apically; propodeal tubercle absent; surface of propodeum superficially rugose, its undivided medial carina and both lateral carinae strongly developed (Fig. 219).

Wings. — First discoidal cell truncate anteriorly; d 1 : d 2 = 9 : 18; parastigma large.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.6, 10.0 and 12.5 times their width, respectively; fore and middle claws with blackish bristles (length of largest bristle of fore claw somewhat longer than in *collaris*), subbasally with 2 ventral, blackish bristles; hind claw simple.

Metasoma. — Length of 1st tergite 2.1 times its apical width, surface reticulato-rugose, dorsal carinae distinct near dorsope only, not distinctly differing from medial rugae

(Fig. 219), spiracle distinctly protruding; length of ovipositor sheath 0.14 times fore wing.

Colour. — Reddish brown; mandible, palpi, antennal sockets anteriorly, tegulae, 2nd tergite and base of 3rd metasomal tergite and antenna, yellowish (but apical segment of antenna somewhat darkened); legs, yellowish, but telotarsi and subapical ring of hind femur, brown; pterostigma, light brown.

Holotype ♀ in BM, London: "Brazil, Nova Teutonia, 27°B, 52-53°L, 24.v.1938, Fritz Plaumann, B.M. 1938-458". Paratypes: 5 ♀, topotypic, 3.vi., 8.vi., 17 and 20.iv. 1938, and .v.1971 (BM, AC, CNC; antennal segments 20); 2 ♀, Surinam, Djoemoe (= near begin of Surinam-river), at light, 24.ii-4.iii.1963, P. H. v. Doesburg jr. (AC); 12 ♂, topotypic, 25.iii., 23.iv., 7.v., 11.v., 12.v. (7 ♂) and 7.vi.1938; by strongly transverse head in dorsal view and enlarged parastigma (like ♂ of *ruficornis* (Fig. 170)) easily discernable from *collaris*; number of antennal segments in 12 ♂: 20 (83.4%), 21 (8.3%) and 22 (8.3%).

Note. Closely related to *collaris*; the large, protruding eye is the best character for separation; the occurrence of both species together at Nova Teutonia makes it most likely that we have two good species. All Brazilean specimens of *collaris* have the discoidal cell sharp anteriorly, which in *epitolus* is always truncate, and have the first metasomal tergite relatively short as compared to *epitolus*.

Blacus (Ganychorus) dracomontanus Haeselbarth

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 67—68.

Only four specimens are known of this species, all from S. Africa: Natal and Transvaal. According to Haeselbarth closely related to *ruficornis*.

Blacus (Ganychorus) genalis Haeselbarth (Fig. 10, 11, 175)

Haeselbarth, 1974, Mitt. Münch. ent. Ges. 64: 68—70.

Throug the kindness of Dr. Haeselbarth I could examine the holotype from S. Africa: length of 3rd antennal segment 1.4 times 4th segment, length of 3rd and 4th segments 6.3 and 4.5 times their width, respectively; length of basalis 2.1 times n. rec. and 1.4 times cu 1; 1st discoidal cell narrowly truncate; length of 1st metasomal tergite 2.2 times its apical width; length of malar space 1.8 times basal width of mandible; subdiscoideus almost straight in left wing, somewhat bent basally in right wing; length of ovipositor sheath ca. 0.16 times fore wing (0.15 times in specimens from Zaïre); length of femur, tibia and basitarsus of hind leg 6.4, 10.2 and 9.0 times their width, respectively; legs completely yellowish brown.

Additionally examined are 2 ♀ from Zaïre: Lubumbashi, 18-19.iii.1971 and 10-11.ii. 1972, collected at light. This species has the subdiscoideus almost straight (Fig. 175) and shape of 1st discoidal cell rather variable (Fig. 10, 11); the first mentioned ♀ has the hind femur dark brown, relatively stout, and the shape of the 1st metasomal tergite less slender than the latter ♀.

Blacus (Ganychorus) haeselbarthi spec. nov. (Fig. 220—226)

Holotype, ♀, length of body 2.0, length of fore wing 2.2 mm.

Head. — Antennal segments 20, length of 3rd segment 1.3 times 4th segment, length

of 3rd and 4th segments 4.0 and 3.0 times their width, respectively, penultimate segments slightly longer than wide (Fig. 220); dorsal length of eye equal to length of temple; frontal suture short, shallow; POL : Ø ocellus : OOL = 5 : 2 : 5; area in front of occipital carina nearly smooth; face superficially rugulose, medially smooth; length of malar space about twice basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum finely reticulato-rugose; zone behind prepectal carina slightly crenulate; epicnemial suture almost smooth, finely rugose; precoxal suture with fine, sloping micro-striae (Fig. 220); metapleural flange distinct; notauli deep, crenulate basally only; mesoscutal lobes rather convex; scutellum smooth, its lateral carina distinctly developed, not protruding apically, along inner side crenulate; propodeal tubercle absent; surface of propodeum superficially reticulato-rugose, its medial carina undivided.

Wings. — First discoidal cell distinctly truncate anteriorly; d 1 : d 2 = 9 : 16; parastigma medium-sized.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.8, 11.0 and 10.0 times their width, respectively; fore and middle claws with blackish teeth and bristles; hind claw simple.

Metasoma. — Length of 1st tergite 1.3 times its apical width, surface longitudinally rugulose, dorsal carinae distinct in basal half, spiracle protruding (Fig. 225); length of ovipositor sheath 0.21 times fore wing.

Colour. — Dark brown; base of antenna, tegulae, legs, palpi, mandible, labrum and legs, reddish; hind femur and telotarsi darkened; pterostigma, brown.

Holotype in MAC, Tervuren: "Tanganyika Terr., Mt. Meru, Olkokola, versant N.O., 2500-2600 m, 3-8.vii.1957", "Mission zoolog. I.R.S.A.C. en Afrique orientale P. Basilewsky et N. Leleup".

Note. Closely related to *diversicornis,* but it differs from this species by the stout scutellum, almost completely brown hind femur, and truncate first discoidal cell.

It is a great pleasure to name this species after Dr. E. Haeselbarth, the excellent reviser of the Palaearctic species of *Blacus* and *Coeloides*. Without his invaluable help this revision would have been far less complete.

Blacus (Ganychorus) strictus Stelfox

Stelfox, 1941, Proc. R. Ir. Acad. 46 B: 121, Fig.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 25.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 119—120, Fig. 21, 38, 98.

Not known from the Netherlands, scarcely collected.

Blacus (Ganychorus) varius Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 114—115, Fig. 25, 28, 92, 110.

Species known from the S.E. Alps, in deciduous forests, according to Haeselbarth.

Blacus (Ganychorus) nixoni Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 115—116, Fig. 16, 27, 37.

Only known from Cyprus.

Blacus (Ganychorus) tripudians Haliday

Haliday, 1835, Ent. Mag. 3: 41.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 25.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch., 16: 94—95, Fig. 1, 31, 93, 103, 107.

Widely distributed species; specimens examined from the Netherlands: from Putten and Ede (both Gelderland); Waarder (Zuid-Holland); Wijster (Drente) and Thorn (Limburg).

Blacus (Ganychorus) maculipes Wesmael

Wesmael, 1835, Nouv. Mém. Acad. Brux. 9: 94.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 22.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 104—106, Fig. 10, 18, 36, 94, 114.

According to Haeselbarth, this species is not expected to be common in the Netherlands. I have examined specimens from Switzerland (Aeschi), Austria (Ebriach and Afritzer See) and Hungary (Debreczen). I have seen a ♂ from the north of the Netherlands (Westernieland (Groningen), 13.viii.1929), which may belong to this species. The record of Snellen van Vollenhoven (1876: 240) could not be confirmed and may apply to *diversicornis*.

Blacus (Ganychorus) ambulans Haliday

Haliday, 1835, Ent. Mag. 3: 43.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 16.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 100—103, figs. 4, 5, 6, 11, 17, 97.

Not yet found in the Netherlands, but the ssp. *macropterus* Haeselbarth, 1973, might be expected.

Blacus (Ganychorus) koenigsmanni Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 103—104, Fig. 19.

Species seldom collected, not found in the Netherlands.

Blacus (Ganychorus) diversicornis (Nees) (Fig. 195, 196)

Nees von Esenbeck, 1834, Hym. Ichn. affin. Mon. 1: 49 (as *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 19.
Haeselbarth, 1973a, Veröff. Zool. St.-Samml., Münch. 16: 107—109, Fig. 12, 24, 29, 100, 109.
Ruth, 1861, Berl. Ent. Z. 5: 136 (*Blacus compar*).

Differs from *striatus* by shorter malar space (Fig. 195), less striate mesopleura and somewhat more slender antenna (Fig. 196).

Examined specimens from the Netherlands: Waarder and Oegstgeest (both Zuid-Holland) and Putten (Gelderland).

Blacus (Ganychorus) kaszabi Haeselbarth

Haeselbarth, 1973b, Folia ent. hung. (N.S.) 26 (Suppl.): 75—78, Fig. 1.

E. Palaearctic species, described from Mongolia.

Blacus (Ganychorus) pallipes Haliday (Fig. 1—8)

Haliday, 1835, Ent. Mag. 3: 41.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 17.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 92—93, Fig. 33.
Wesmael, 1835, Nouv. Mém. Acad. Brux. 9: 98 (*Blacus tuberculatus*).

Largest species of the genus; specimens examined from: England: Winpith (Dorset); Netherlands: Ulvenhout (Noord-Brabant), Wijster (Drente) and Waarder (Zuid-Holland). Snellen van Vollenhoven (1876: 240) also mentioned Heemstede (Noord-Holland).

Blacus (Ganychorus) nitidus Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 112—114, Fig. 20, 32.

One ♂ from Norway (Selva, 63°36'N/9°43'E), new to the Norwegian fauna, which confirms Haeselbarth's assumption that this species has a boreo-montane distribution.

Blacus (Ganychorus) apaches spec. nov. (Fig. 227—234)

Holotype, ♀, length of body 1.8, length of fore wing 2.0 mm.

Head. — Antennal segments 20 (also in ♀ paratype), length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 4.0 and 3.3 times their width, respectively, length of penultimate segments 1.7—1.8 times their width; eye bare; dorsal length of eye 1.2 times temple; POL : Ø ocellus : OOL = 7 : 4 : 8; frontal suture shallow; frons and vertex smooth; area in front of occipital carina narrowly crenulate; face smooth; length of malar space ca. 1.5 times basal width of mandible; malar suture present.

Mesosoma. — Length of mesosoma 1.2 times height; side of pronotum reticulate except for dorsal third; zone behind prepectal carina crenulate; epicnemial suture smooth; precoxal suture striato-rugose; metapleural flange distinct; notauli narrow, smooth, basally crenulate only; mesoscutal lobes moderately convex; scutellum smooth, except for some sublateral short carinae, its lateral carina lamelliform, somewhat (but distinctly in paratype) protruding apically; propodeal tubercle absent; surface of propodeum almost smooth, superficially rugose, its medial carina lamelliform, undivided (Fig. 232).

Wings. — First discoidal cell narrowly truncate anteriorly; d 1 : d 2 = 3 : 7; parastigma medium-sized.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 10.0 and 9.0 times their width, respectively; fore and middle claws with large blackish bristles (Fig. 229); hind claw simple (except for some yellowish setae).

Metasoma. — Length of 1st tergite 2.1 times its apical width, surface longitudinally rugoso-striate (Fig. 232), dorsal carinae distinct in basal three-fifths, spiracle flat; length of ovipositor sheath 0.19 times fore wing.

Colour. — Reddish brown; metasoma apically and telotarsi darkened; pronotum, orange; pedicellus and clypeus partly, mandible, labrum, palpi, tegulae and legs, yellowish; pterostigma, light brown.

Holotype ♀ in BM, London: "Evergreen shrubs on sandy shore, 9-17.xii.1961", "Arum Valley below Tumlingtar, River Sabhaya west shore, c. 1800'", "Brit. Mus. East Nepal Exp. 1961-62, R. L. Coe Coll. B.M. 1962-177". Paratype: 1 ♀, topotypic (AC).

Blacus (Ganychorus) pectinatus Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 99—100, Fig. 9, 15, 101, 106, 111.

Not known from the Netherlands.

Blacus (Ganychorus) conformis Wesmael

Wesmael, 1835, Nouv. Mém. Acad. Brux. 9: 96.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 109—111, Fig. 30, 102, 108.

Not yet found in the Netherlands, but it may be expected in the eastern part of the country.

Blacus (Ganychorus) capeki Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 95—96, Fig. 13, 34, 95, 104, 112.

Species recorded from Central Europe.

Blacus (Ganychorus) mischocytus spec. nov. (Fig. 235—241)

Holotype, ♀, length of body 2.3, length of fore wing 2.5 mm.

Head. — Antennal segments 20 (in paratype also 20, in allotype 21), length of 3rd segment 1.8 times 4th segment; length of 3rd and 4th segments 4.5 and 2.8 times their width, respectively; length of penultimate segments ca. 1.5 times their width; eye bare; dorsal length of eye equal to length of temple (Fig. 240); POL : Ø ocellus : OOL = 3 : 2 : 5; frontal suture distinct; frons and vertex smooth; area in front of occipital carina narrowly crenulate; face smooth; length of malar space slightly less than twice basal width of mandible; malar suture wanting.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum rugoso-reticulate, except for dorsal half (Fig. 235); zone behind prepectal carina crenulate; epicnemial suture smooth; precoxal suture smooth except for two medial rugae (Fig. 235); notauli distinctly crenulate, narrow; mesoscutal lobes moderately convex; scutellum smooth but superficially rugose and with short sublateral carinae, its lateral carina lamelliform, protruding apically; propodeal tubercle small, sharp; dorsal surface of propodeum smooth (in paratype superficially rugose), its undivided medial carina and both lateral carinae strongly developed, posterior surface reticulate.

Wings. — First discoidal cell distinctly petiolate anteriorly; d 1 : d 2 = 9 : 19; parastigma rather small.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.8, 10.0 and 7.0 times their width, respectively; fore and middle claws with bristles (of middle claw rather indistinct, but distinctly developed in paratypes); hind claw simple.

Metasoma. — Length of 1st tergite 1.9 times (1.9—2.2 in paratypes) its apical width, surface reticulato-rugose, smooth in apical fifth, dorsal carinae distinct in basal fifth, spiracle flat (Fig. 238); length of ovipositor sheath 0.20 times fore wing.

Colour. — Reddish brown; pedicellus, annellus, palpi, mandible, tegulae and metasoma except for 1st tergite, yellowish; legs yellowish but telotarsi, hind femur subapically and hind tibia largely, brownish.

Holotype ♀ in BM, London: "Tjibodas, Java, 5.000-7.000 ft, Aug. 1913, Dr.

Koningsberger, 1913-523". Paratypes: 2 ♀, topotypic (AC, BM); 1 ♂ allotype, topotypic, parastigma enlarged and 1st discoidal cell widely truncate, propodeal tubercle absent, medial carina double posteriorly (BM).

Note. Near *nixoni*, but *mischocytus* has more antennal segments, face smooth, face more narrowed ventrad (cf. Fig. 27 in Haeselbarth, 1973a), propodeal tubercle sharp, malar space longer, 1st metasomal tergite much more slender, hind femur darkened subapically and 1st discoidal cell of ♀ distinctly petiolate (cf. Fig. 37 in Haeselbarth, 1973a).

Blacus (Ganychorus) stami spec. nov. (Fig. 242—248)

Holotype, ♀, length of body and of fore wing 2.3 mm.

Head. — Apical segments of antenna broken off (antennal segments of paratype 20), length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 5.2 and 3.7 times their width, respectively; eye bare; dorsal length of eye 1.1 times temple; POL : Ø ocellus : OOL = 9 : 4 : 9; frontal suture shallow; frons, vertex, face and clypeus smooth; area in front of occipital carina finely crenulate; length of malar space ca. 1.7 times basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum largely reticulato-rugose; zone behind prepectal carina with some widely spaced short crenulae; epicnemial suture almost smooth, with superficial rugae; precoxal suture complete, finely striate; notauli deep, only crenulate anteriorly, moderately narrow; mesoscutal lobes moderately convex; scutellum smooth, its lateral carina complete, lamelliform apically, protruding (Fig. 242); propodeal tubercle absent; dorsal surface of propodeum superficially rugose, its posterior surface reticulate and its medial carina undivided posterodorsally (Fig. 248).

Wings. — First discoidal cell truncate anteriorly; d 1 : d 2 = 7 : 23; parastigma rather large.

Legs. — Length of femur and tibia of hind leg 7.0 and 9.6 times their width, respectively; fore and middle claws with large blackish bristles; hind tarsi broken off.

Metasoma. — Length of 1st tergite 1.9 times its apical width, its surface superficially reticulato-rugose medially and with some carinae laterally (Fig. 248), spiracle distinctly protruding, dorsal carina distinct in basal fifth; length of ovipositor sheath 0.15 times fore wing.

Colour. — Reddish brown; antenna, palpi, mandible, tegulae, pterostigma, veins, 1st and 2nd metasomal segments, and pronotum, more or less yellowish; legs yellowish but hind femur brown except its base.

Holotype ♀ in Collection Stam, Den Haag: "No. v. 8280, Stam Coll.", "Zaïre, Lubumbashi, 5-6.xi.1971, A. B. Stam, at light". Paratype: 1 ♀, topotypic, no. v. 7401 (AC).

Notes. Species characterized by relatively short basal vein, yellowish pterostigma, deep notauli, basally bent subdiscoideus, shape of 1st metasomal tergite, and apically protruding lateral carina of scutellum. It is a pleasure to dedicate this species to Dr. A. B. Stam, who collected many interesting small Hymenoptera in Central Africa.

Hysterobolus Viereck, 1913, subgenus, stat. nov.

Type-species: *Hysterobolus mallochi* Viereck, 1913.

Diagnosis. — Length of body 2.0—2.6, length of fore wing 2.1—2.6 mm. Antennal segments of ♀ 18—19; eye with some short setae; occipital carina strongly developed; frons and vertex smooth; at least upper part of face transversely rugose; length of malar space 1.5—2.0 times basal width of mandible, without malar suture; metapleural flange rather large, blunt; notauli complete, more or less deep; scutellar suture wide and deep; scutellum reticulate (in ♂ usually weaker developed), lateral carina well developed, complete; side of scutellum reticulato-rugose; parastigma small or slightly enlarged; 1st discoidal cell sharp anteriorly, sometimes subpetiolate; d 1 : d 2 = 1 : 1.3—1.9; metacarp not distinctly surpassing radial cell; length of hind femur 4.3—5.6 times its width; hind coxa reticulato-rugose dorsally; fore claw of ♀ usually with long, rather stout and dark bristles, seldom indistinct; middle and hind claws simple; propodeal tubercle large or medium-sized (usually weaker developed in ♂; medial carina of propodeum undivided; length of ovipositor sheath 0.15—0.22 times fore wing; metasoma smooth after 1st tergite; hypopygium small; ovipositor straight.

Distribution. — Holarctic: one species; Nearctic: four species; Palaearctic: one species. All species are rarely collected, except *robustus*.

Note. Important apomorphous characters are: 1 — scutellum reticulate; 2 — lateral carina of scutellum complete; 3 — fore claw of ♀ with blackish bristles, seldom indistinctly developed; 4 — propodeal tubercles large to medium-sized; 5 — medial carina of propodeum undivided or indistinct; 6 — 2nd tergite of metasoma smooth; 7 — ovipositor short.

Key to Nearctic species of the subgenus *Hysterobolus*

1. Length of 1st metasomal tergite 2.0—2.3 times its apical width, its dorsal carinae usually confluent (Fig. 260, 267); mesoscutal lobes slightly convex 2
— Length of 1st tergite 1.3—1.9 times its apical width, its dorsal carinae remote from each other (Fig. 253, 272); if intermediate then mesoscutal lobes distinctly convex 3
2. Temples sub-parallel, maximum width of head 1.5 times its minimum width in dorsal aspect (Fig. 258); propodeal tubercle sub-truncate (Fig. 255); face relatively long (Fig. 256) . . . . . *mallochi* (Viereck) (p. 217)
— Temples narrowed behind, its maximum width 1.7 times its minimum width (Fig. 264); propodeal tubercle sharp (Fig. 262); face relatively short (Fig. 266) . . . . . *trapezoides* spec. nov. (p. 218)
3. Precoxal suture with some widely spaced rugae (Fig. 268); length of ovipositor sheath 0.22 times fore wing; face with distinctly defined, smooth triangle (Fig. 273); notauli rather wide . . . . . *redactus* spec. nov.[1]) (p. 218)
— Precoxal suture with longer, closely spaced rugae (Fig. 275); length of ovipositor sheath 0.15—0.19 times fore wing; face completely rugose or smooth area indistinctly defined (Figs. 276, 285); notauli variable (Fig. 254, 277) 4
4. Mesoscutal lobes flattened posteriorly; head elongate in frontal aspect (Fig. 276); notauli rather wide (Fig. 277); antennal segments of ♀ 17 . . . . . *patulus* spec. nov. (p. 219)
— Mesoscutal lobes convex (Fig. 286); head shorter in frontal aspect (Fig. 251, 285); notauli rather narrow (Fig. 254); antennal segments of ♀ 18 . . . . . *robustus* Haeselbarth (p. 220)

[1]) If hind femur is largely infuscated, cf. *trapezoides*.

Key to Palaearctic species of the subgenus *Hysterobolus*

1. Eye comparatively long in dorsal aspect, 0.9 times temple (Fig. 283); malar space sub-equal to ITL (Fig. 285); both sexes known; macropterous form only . . . . . *robustus* Haeselbarth (p. 220)
— Eye comparatively short in dorsal aspect, 0.7 times temple (Fig. 39 in Haeselbarth, 1973a); only ♀ known; usually micropterous; malar space longer than ITL (cf. Fig. 276) . . . . . *manillanus* Ruthe (p. 220)

Blacus (Hysterobolus) mallochi (Viereck) comb. nov. (Fig. 255—261)

Viereck, 1913, Proc. U. S. natn. Mus. 44: 559.
Shenefelt, 1970, Hym. Cat. (nov. ed.) 5 (2): 251.

Holotype, ♀, length of body 2.6, length of fore wing 2.4 mm.

Head. — Antennal segments 18, 3rd segment 1.4 times as long as 4th segment, length of 3rd and 4th segments 3.8 and 2,0 times their maximum width, respectively, penultimate segments slightly longer than wide (Fig. 255); frontal suture weakly developed (Fig. 258); area in front of occipital carina distinctly crenulate; POL : Ø ocellus : OOL = 6 : 3 : 7; dorsal length of eye 0.8 times length of temple, temples narrowed behind; maximum width of head 1.5 times its minimum width (Fig. 258); face distinctly transversely rugose.

Mesosoma. — Length of mesosoma 1.5 times its height; side of pronotum reticulate except dorso-posteriorly (Fig. 255); zone behind prepectal carina crenulate; epicnemial suture narrowly crenulate; precoxal suture sparsely reticulate, widened anteriorly (Fig. 255); mesoscutal lobes scarcely convex; notauli wide, distinctly crenulate, widened apicad (Fig. 261); scutellar suture with four longitudinal carinae; lateral carina of scutellum protruding apically (Fig. 255). Propodeal tubercle large (Fig. 255); propodeum reticulate, sculpture indistinct anteriorly.

Wings. — R 2 straight; d 1 : d 2 = 6 : 8.

Legs. — Length of femur, tibia and basitarsus 4.3, 9.7 and 7.7 times their width, respectively; fore claw with long, dark brownish bristles; middle and hind claws simple, medium-sized.

Metasoma. — Length of 1st tergite 2.2 times its apical width, superficially striato-rugose, dorsal carinae distinct in basal half, confluent in front of spiracles (Fig. 260), spiracle slightly protruding; length of ovipositor sheath 0.22 times fore wing.

Colour. — Dark fulvous; basal antennal segments (but distal margins dark), mandible, labrum, 1st and 2nd metasomal segments and legs, yellow; distal antennal segments, brown; clypeus (partly), mesoscutum and scutellum, yellowish red; wing veins, brown; pterostigma basally and parastigma, yellowish.

Holotype in USNM, Washington: "Rosslyn, Va.", "22.ix.1912", "Mallogh Coll", "type no. 15285 USNM", "*Histerobolus* (sic!) *mallochi* Vier, Type ♀".

In the USNM collection there is a second ♀ of this species from Vienna, Virginia (21.viii.1932, J. C. Bridwell) with antennal segments 19, metasomal segments with membranous margins and 1st tergite more sculptured; further examined: 3 ♀ from Hull, Quebec and Laurel, Maryland.

Blacus (Hysterobolus) trapezoides spec. nov. (Fig. 262—267)

Holotype, ♀, length of body 2.4, length of fore wing 2.5 mm.

Head. — Antennal segments 19, 3rd segment 1.5 times long as 4th segment, length of 3rd and 4th antennal segments 4.8 and 3.3 times their width, respectively, penultimate segments distinctly longer than wide (Fig. 262); area in front of occipital carina distinctly crenulate; frontal suture present as a short depression (Fig. 264); POL : Ø ocellus : OOL = 4 : 3 : 6; dorsal length of eye equal to temple; temple distinctly narrowed behind eye; maximum width of head 1.7 times its minimum width (Fig. 264); face rather superficially rugose medially.

Mesosoma. — Length of mesosoma 1.4 times its maximum height; side of pronotum reticulate, except dorsal third (Fig. 262); zone behind prepectal carina crenulate; epicnemial suture superficially rugose; precoxal suture wide with distinct, nearly longitudinal rugae (Fig. 262); mesoscutal lobes slightly convex; notauli wide, remotely crenulate, slightly widened apicad, with medial carina apically (Fig. 265); scutellar suture with three longitudinal carinae. Propodeal tubercle rather large, sharp apically (Fig. 262); propodeum sparsely reticulate, almost smooth anteriorly.

Wings. — R 2 straight, d 1 : d 2 = 11 : 17.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 13.0 and 9.3 times their width, respectively; fore claw with some scarcely visible darker bristles; middle and hind claws simple, medium-sized.

Metasoma. — Length of 1st tergite 2.1 times its width, reticulato-rugose, dorsal carinae distinct in basal third, confluent (Fig. 267); length of ovipositor sheath 0.16 times fore wing.

Colour. — Dark brown; antenna (except for scapus and terminal segments), palpi, tegulae, pterostigma, wing veins, legs (except for darkened apices of tibia and tarsus and base of tibia) and metasoma behind 1st tergite, yellowish brown; base of pterostigma, yellowish.

Holotype ♀ in CNC, Ottawa: "Mex. Dgo., 8000′ (ft), El Salto, 14 mi SW, 26.vi. 1964, W. R. M. Mason".

I have seen two aberrant ♀ from Mexico (Chis., 7 mi. SE. San Cristobal, 26.v.69, 7000′, H. J. Teskey) and Colombia (Quindo 11 km E. Calarca, 9.iii.1974, 7000′, S. & J. Peck) with dark hind legs and 1st tergite 1.7 times its apical width. Probably they belong to *trapezoides*.

Blacus (Hysterobolus) redactus spec. nov. (Fig. 268—274)

Holotype, ♀, length of body 2.6, length of fore wing 2.4 mm.

Head. — Antennal segments 19, 3rd segment 1.5 times as long as 4th segment, length of 3rd and 4th segments 4.0 and 2.8 times their width, respectively, penultimate segments slightly longer than wide (Fig. 268); area in front of occipital carina distinctly crenulate; frontal suture short (Fig. 269); POL : Ø ocellus : OOL = 4 : 2 : 5; dorsal length of eye 0.9 times length of temple, temple narrowed behind (Fig. 269); face weakly transversely rugose, except for a smooth, median triangle.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum crenulate, except for smooth distal two-fifths; zone behind prepectal carina almost smooth; epicnemial suture superficially sculptured; precoxal suture reduced with some widely spaced,

inclivous rugae (Fig. 268); mesoscutal lobes distinctly convex; notauli rather wide, superficially crenulate, slightly widened apicad (Fig. 271); scutellar suture with four weakly developed longitudinal carinae; lateral carina of scutellum protruding apically (Fig. 268). Propodeal tubercle large, sharp apically (Fig. 268); propodeum almost smooth dorsally, except for medial carina.

Wings. — R 2 and cu 1 weakly sinuate (Fig. 268); d 1 : d 2 = 9 : 17.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.3, 10.8 and 7.0 times their width, respectively; fore claw apparently simple, bristles indistinct; middle and hind claws simple, medium-sized.

Metasoma. — Length of 1st tergite 1.6 times its apical width, medio-dorsally superficially reticulato-rugose, laterally rugoso-striate, dorsal carinae distinct in basal two-thirds, spiracle flat; length of ovipositor sheath 0.22 times fore wing.

Colour. — Chestnut-brown; antenna (darkened apically), palpi, legs (5th tarsal segment darkened) and tegulae, brownish yellow; mesoscutum, face, clypeus and mandible, reddish brown; pterostigma, brown (but small basal part yellowish).

Holotype ♀ in SC, Madison: "Wexford Co., Mich., 3.ix.1944, R. R. Dreisbach".

Blacus (Hysterobolus) patulus spec. nov. (Fig. 275—280)

Holotype, ♀, length of body 2.6, length of fore wing 2.4 mm.

Head. — Apical segments of antenna missing (in paratype 17), 3rd segment 1.6 times as long as 4th segment, length of 3rd and 4th segments 3.6 and 2.3 times their width, respectively; area in front of occipital carina slightly crenulate; frontal suture short; POL : Ø ocellus : OOL = 5 : 2 : 5; dorsal length of eye 0.7 times length of temple temple narrowed behind (Fig. 279); face transversely rugose.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulate, except smooth dorsal two-fifths; zone behind prepectal carina sparsely crenulate; epicnemial suture almost smooth; precoxal suture reticulato-rugose, wide (Fig. 275); mesoscutal lobes flattened posteriorly; notauli rather wide, superficially and sparsely crenulate, carinate laterally, not widened apicad (Fig. 277); scutellar suture with one longitudinal carina. Propodeal tubercle large, rather obtuse (Fig. 275); propodeum densely reticulate, anteriorly a narrow smooth area.

Wings. — R 2 straight; d 1 : d 2 = 11 : 17.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.2, 8.7 and 6.8 times their width, respectively; fore claw with long, rather stout bristles; middle and hind claws simple, rather small.

Metasoma. — Length of 1st tergite 1.7 times its apical width, medio-dorsally reticulate, superficially striate laterally, dorsal carinae distinct in basal 0.7 (Fig. 280), spiracle slightly protruding; length of ovipositor sheath 0.15 times fore wing.

Colour. — Dark chestnut-brown; antenna, legs, palpi, mandible, tegulae, 2nd and 3rd metasomal tergites, brown; pterostigma, brown (except for small basal part, yellowish).

Holotype ♀ in CNC, Ottawa: "Cultus Lake, B.C., 1.vii.1948, H. R. Foxlee". Paratype: "Robson, B.C., 4-7.vii.1947, H. R. Foxlee" (AC).

Closely related to the Palaearctic *mamillanus*, except for minor differences; differs mainly by the laterally carinate notauli, number of antennal segments (18—19 in *mamillanus*) and the wider, more flattened mesoscutum.

Blacus (Hysterobolus) robustus Haeselbarth (Fig. 249—254, 281—287)

Haeselbarth, 1973, Veröff. zool. St.-Samml., Münch. 16: 116—117, Fig. 23, 40, 99.

Described after 2 ♀ from Arizona and Michigan; length of body 2.6—2.8, length of fore wing 2.6 mm; small specimens examined from North Carolina and Quebec, measuring ca. 2.0 mm.

Head. — Antennal segments 18, 3rd segment 1.6 times as long as 4th segment, length of 3rd and 4th segments 4.1 and 2.6 times their width, respectively, penultimate segments slightly longer than wide; area in front of occipital carina distinctly crenulate; frontal suture short; POL : Ø ocellus : OOL = 4 : 2 : 5; dorsal length of eye 0.9 times temple, temple sub-parallel (Figs. 252, 283); face transversely rugose.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum puncto-reticulate, except for dorsal smooth area (Fig. 281); narrow zone behind prepectal carina crenulate; epicnemial suture rugose; precoxal suture wide, with sloping distinct rugae (Fig. 281); mesoscutal lobes distinctly convex (especially in lateral aspect); posterior half of notauli crenulate, slightly widened posteriorly (Fig. 286); scutellar suture with one distinct and two weakly developed carinae (Fig. 286). Propodeal tubercle large, more or less sharp apically (Fig. 281); propodeum densely reticulate, smooth anteriorly, except for medial carina.

Wings. — R 2 straight; d 1 : d 2 = 9 : 12—15.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.0—5.5, 10.5—11.9 and 8.6 times their width, respectively; fore claw with long, black bristles; middle and hind claws simple, medium-sized.

Metasoma. — Length of 1st tergite 1.4—1.5 times its apical width, reticulato-striate, dorsal carinae distinct in basal third; spiracle flat; length of ovipositor sheath 0.18 times fore wing (0.15 times in small form, Fig. 249—254).

Colour. — Blackish brown; metasoma, except for 1st tergite, and antenna largely, brown; legs, base of antenna, palpi, mandible, tegulae, pterostigma and wing veins, brownish yellow; femur, tibia and tarsus of hind leg darkened apically; base of hind tibia, yellowish; sometimes mesoscutum reddish.

Examined 17 ♀ from: Arizona (Rustlers Park), North Carolina (Great Smoky Mountains Nat. Park, Fig. 249—254), Georgia (Rabun Co.), Michigan (Midland Co.), New York (Lake Placid), Quebec (Old Chelsea, Lac Phillips, Norway Bay), Ontario (Marmora area (from moist fungus-rich wooded creed bed), Rondeau Prov. Pk., Innisville) (USNM, CNC, AC): paratype from König Coll. "B 385" (from Dagebüll, BRD). The latter has mesoscutal lobes less convex and length of 1st tergite 1.3 times its apical width (Fig. 287). I have seen males with 23—24 antennal segments which may be conspecific with *robustus*, from Ontario, Quebec and Virginia.

Blacus (Hysterobolus) mamillanus Ruthe (Fig. 288)

Ruthe, 1861, Berl. ent. Z. 5: 144.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 22.
Haeselbarth, 1973, Veröff. zool. St.-Samml., Münch. 16: 118—119, fig. 39.
Marshall, 1889, Trans. R. ent. Soc. London: 174 (*Blacus aptenodytes*).

This is the only species not yet found in the Nearctic region; it may be confused with *patulus, adinus* and *robustus*. Through the kindness of Dr. Haeselbarth I could examine a ♀ from the former Konow-collection: Fürstenberg i.M., 20.4.(18)91, det. Haeselbarth

1970. This specimen is rather small (2.1 mm), but according to Haeselbarth the size of specimens varies from 2.0 to 2.5 mm; antenna reddish, 3rd segment 1.5 times as long as 4th segment, 3rd and 4th segment 3.0 and 2.0 times their width, respectively, penultimate segments square; length of eye 0.7 times temple; length of mesosoma 1.5 times its height; mesoscutal lobes slightly convex, notauli shallow, not or slightly carinated; scutellar suture rather shallow; precoxal suture wide, complete, with distinct carina apico-dorsally; propodeal tubercle medium-sized, rather blunt; propodeum smooth anteriorly; 1st metasomal tergite 1.4 times its apical width (Fig. 288); length of ovipositor sheath 0.18 times fore wing.

Blacus Nees, subgenus
(Fig. 300—446)

Nees von Esenbeck, 1818, Nova Acta Acad. Caesar. Leop. Carol. 9: 306.

Type-species: *Bracon humilis* Nees.

Diagnosis. — Length of body 1.5—3.7, length of fore wing 1.6—3.3 mm; antennal segments of ♀ 17, of ♂ 19—21; eye bare, small to medium-sized; occipital carina complete; usually frontal suture absent; length of maxillary palpus about equal to height of head or slightly shorter; face often rugose; clypeus smooth (except in *masoni*), wide and rather convex, its margin straight medially, thin; vertex and frons smooth (except in *masoni*); length of malar space about equal to or ca. twice basal width of mandible; side of pronotum reticulate except for dorsal second fifth portion; malar suture variable; metapleural flange usually distinct, blunt; notauli more or less complete; mesoscutal lobes and scutellum smooth (except in *masoni* and *paganus*); lateral carina of scutellum absent or weakly developed; side of scutellum reticulato-rugose; d 1 : d 2 = 1 : 0.7—3.8; metacarp surpassing radial cell in some Palaearctic species only; length of hind femur 3.7—6.9 times its width; all tarsal claws simple, medium-sized; hind coxa reticulato-rugose dorsally; propodeal tubercle present (but sometimes indistinctly developed); propodeal carinae less developed, medial carina indistinctly divided or undivided, or indistinctly developed on posterior surface of propodeum; length of 1st tergite of metasoma 1.4—2.2 times its apical width, its spiracle scarcely or not protruding; 2nd tergite smooth or with superficial, irregular depressions apically; ovipositor slightly bent ventrad (except in *masoni* and *cohibilis*); length of ovipositor sheath 0.18—0.46 times length of fore wing, but 0.88 times fore wing in *hastatus*.

This subgenus may be divided in two sections:

Section A: Parastigma relatively small (Fig. 300, 327, 339); 1st discoidal cell sharp anteriorly, sometimes subpetiolate (and in some aberrant specimens narrowly truncate); cu 3 usually absent or nearly so; propodeal tubercle small or indistinctly developed, often sharp apically; precoxal suture narrow, sometimes absent anteriorly; notauli rather weakly impressed, sometimes reduced posteriorly; length of ovipositor sheath usually 0.18—0.29 times fore wing, only in *cohibilis* 0.40 and in *hastatus* 0.88 times fore wing.

Syn.: *Miocolus* Foerster, 1862; *interstitialis*-, *hastatus*-, *exilis*- and *errans*-groups of Haeselbarth, 1973a.

Distribution. — Holarctic: two species; Nearctic: six species; Palaearctic: 15 species; Ethiopian: one species; Neotropical: one species.

Section B: Parastigma well developed, medium-sized to large (Fig. 364, 377, 394); 1st discoidal cell truncate anteriorly; cu 3 usually present, distinct; propodeal tubercle

rather large (Fig. 378, 390, 396) to small, only absent in *modestus*; precoxal suture usually wide, complete; notauli complete, usually deeply impressed; length of ovipositor sheath 0.22—0.46 times fore wing.

Syn.: *Blacus* Nees; *Goniocormus* Foerster, 1862; *humilis*-group of Haeselbarth, 1973a.

Distribution. — Holarctic: two species; Nearctic: three species; Palaearctic: four species.

Note. Important apomorphous characters are: 1 — propodeal tubercles usually present, seldom indistinctly developed or absent; 2 — propodeal carinae reduced; 3 — medial carina of propodeum indistinctly divided or invisible; 4 — 2nd tergite smooth or with some microsculpture; 5 — antennal segments of ♀ restricted to 17.

Key to Nearctic and Neotropical species of the subgenus *Blacus*

1. Parastigma small (Fig. 300, 327, 339); 1st discoidal cell sharp anteriorly (but sometimes narrowly truncate); propodeal tubercle small or absent . . . section A) 2
— Parastigma large to medium-sized (Fig. 364, 377, 394); 1st discoidal cell more or less truncate anteriorly; propodeal tubercle usually distinct (only in *modestus* absent) . . . . . section B) 11
2. Middle lobe of mesoscutum and scutellum remotely punctate (Fig. 303, 309), rather setose; species with stout antenna (Fig. 300) 3
— Middle lobe and scutellum smooth or somewhat punctulate, in the latter case antenna relatively slender (Fig. 346) 4
3. Stemmaticum and upper face punctato-rugose (Fig. 301, 302) . . . . . *maryi* f. *nidicola* Hedqvist (p. 226)
— Stemmaticum and upper face smooth (Fig. 307, 308) . . . . . *maryi* f. *maryi* Hellén (p. 227)
4. Length of 1st metasomal tergite 2.0 times its apical width (Fig. 317); mesoscutum relatively slender (Fig. 315); length of hind tibia 8.3 times its width; hind femur blotched . . . . . *crassicrus* spec. nov. (p. 228)
— Length of 1st tergite 1.4—1.7 times its apical width (Fig. 322, 363); mesoscutum relatively stout (Fig. 362); length of hind tibia more than 8.3 times its width or hind femur smooth 5
5. Length of ovipositor sheath 0.40 times fore wing; r 2 scarcely curved (Fig. 318); length of 1st metasomal tergite 1.7 times its apical width . . . . . *cohibilis* spec. nov. (p. 228)
— Length of ovipositor sheath 0.18—0.23 times fore wing; r 2 more or less curved (Fig. 327, 352); length of 1st tergite 1.4—1.6 times its apical width 6
6. Ovipositor distinctly shorter than hind femur; 1st metasomal tergite flattened and widened apicad (Fig. 330, 444), its lateral parts sculptured; scutellar suture with only medial carina distinct, except for more or less distinctly developed microsculpture 7
— Ovipositor usually equal to or longer than hind femur, if somewhat shorter, then sides of 1st tergite about parallel (Fig. 363) and distinctly convex apically; if 1st tergite is flattened apically, then ovipositor longer and lateral parts of 1st tergite almost smooth (Fig. 341); scutellar suture usually with distinct carinae beside medial carina 8
7. Length of body 1.5—1.9 mm, length of malar space ca. twice basal width of mandible

(Fig. 326); cu 1 and veins of hind wing less sclerotized; clypeus distinctly convex in lateral aspect (Fig. 324), smooth . . . . . *asaphus* spec. nov. (p. 229)

— Length of body 2.9 mm, length of malar space ca. 1.5 times basal width of mandible (Fig. 441); veins fully sclerotized; clypeus distinctly flattened in lateral aspect (Fig. 440), punctate (Fig. 441) . . . . . *chilensis* spec. nov. (p. 243)

8. Dorsal length of temple of ♀ 1.0—1.2 times eye (measured with stemmaticum in optical plane) (Fig. 334, 338), seldom longer, then 1st tergite widened apicad (Fig. 341); length of mesosoma 1.3 times its height 9

— Dorsal length of temple of ♀ 1.3—1.4 times eye (Fig. 347, 359); length of mesosoma 1.3—1.5 times its height; sides of 1st tergite about parallel (Fig. 351, 363) 10

9. Propodeal tubercle sharp, usually distinct; 1st tergite less widened apicad (Fig. 333); latero-apically sculptured and distinctly convex medially . . . . . *cognatus* spec. nov. (p. 230)

— Propodeal tubercle indistinct, more or less blunt; 1st tergite more dilated apicad (Fig. 341), latero-apically smooth or nearly so and flattened medially . . . . . *defectuosus* Provancher (p. 231)

10. Length of 1st tergite 1.5 times its apical width, relatively wider (Fig. 351), evenly convex and finely reticulate; length of body 2.5—2.6 mm . . . . . *rufipes* (Ashmead) (p. 232)

— Length of 1st tergite 1.6 times its apical width, relatively narrower (Fig. 363), unevenly convex and less finely reticulate; length of body 1.6—2.2 mm . . . . . *exilis* (Nees) (p. 233)

11. Medial carina of propodeum double dorsally; length of scutellar suture about equal to its width (Fig. 369); length of 1st tergite 1.6 times its apical width and length of ovipositor sheath 0.40 times fore wing . . . . . *apodastus* spec. nov. (p. 234)

— Medial carina of propodeum simple; scutellar suture distinctly wider than long (Fig. 414); combination of length of 1st tergite and of ovipositor sheath different . . 12

12. Scutellum punctulate (Fig. 379); 1st tergite shiny, at most superficially sculptured, comparatively flat (Fig. 380), ca. 1.5 times its apical width; penultimate segments of antenna longer than wide or sub-equal (Fig. 378) . . *masoni* spec. nov. (p. 235)

— Scutellum smooth (at most with some scarcely visible punctures anteriorly); 1st tergite largely dull and sculptured (Fig. 373, 397), convex, 1.4—2.2 times its apical width; penultimate segments variable (Fig. 371, 390, 396) 13

13. Antenna (especially basal segments) compact (Fig. 371, 390), penultimate segments transverse or quadrate; length of 1st tergite 1.4—1.7 times its apical width; propodeal tubercles rather large and blunt (Fig. 371, 390) 14

— Antenna (especially basal segments) comparatively slender (Fig. 396, 410, 416), penultimate segments quadrate or longer than wide; length of 1st tergite 1.8—2.2 times its apical width; propodeal tubercles rather small and sharp (Fig. 396, 404, 419) . . . . . *humilis* (Nees) (p. 235)

14. Ovipositor sheath 0.37—0.46 times fore wing (Fig. 390); 3rd antennal segment ca. 1.5 times 4th segment; basal half of antenna yellowish . . . . . *caduceus* spec. nov. (p. 237)

— Ovipositor sheath shorter than 0.32 times fore wing (Fig. 371); 3rd antennal segment more or less sub-equal to 4th segment; antenna largely brown . . . . . *paganus* Haliday (p. 238)

Key to Palaearctic and Ethiopian species of the subgenus *Blacus* (after Haeselbarth, 1973a, modified)

1. Micropterous, fore wing scarcely surpassing propodeum; propodeal tubercle distinct, sharp . . . . . *rufescens* Ruthe (p. 239)
— Macropterous, length of fore wing about equal to body length; propodeal tubercle variable, if present 2
2. Parastigma small (Fig. 300); 1st discoidal cell sharp anteriorly, seldom narrowly truncate; propodeal tubercle small or absent 3
— Parastigma large to medium-sized (Fig. 377, 393); 1st discoidal cell truncate anteriorly; propodeal tubercle large, small or absent 19
3. Subdiscoideus straight basally or nearly so (Fig. 439); cu 3 and propodeal tubercle absent 4
— Subdiscoideus distinctly bent basally (Fig. 396, 410); cu 3 usually present; propodeal tubercle present or absent 5
4. Mesosoma and basal half of metasoma reddish; metacarp somewhat surpassing radial cell (Fig. 439); scutellum smooth (except apically); length of ovipositor sheath 0.27 times fore wing, somewhat longer than hind femur (Ethiopian species) . . . . . *inopinus* spec. nov. (p. 242)
— Mesosoma and basal half of metasoma dark brown; metacarp not surpassing radial cell (Fig. 63 in Haeselbarth, 1973a); scutellum superficially rugose; length of ovipositor sheath 0.21 times fore wing, about equal to hind femur (Palaearctic species) . . . . . *interstitialis* Ruthe (p. 239)
5. Scutellum with closely spaced and distinct rugae; propodeal tubercle short and blunt; wings brownish; length of ovipositor sheath about equal to fore wing . . . . . *hastatus* Haliday (p. 240)
— Scutellum at least medially smooth; propodeal tubercle variable or absent; wings usually hyaline; length of ovipositor sheath about half the length of fore wing or less 6
6. Metacarp not distinctly surpassing radial cell, r 2 weakly but distinctly bent (Fig. 300), usually not reaching wing apex; usually length of ovipositor sheath equal to hind femur or shorter; usually propodeal tubercle indistinct 7
— Metacarp distinctly surpassing radial cell (Fig. 68, 69 in Haeselbarth, 1973a) or r 2 straight or indistinctly bent (Fig. 66, 67, 70 in Haeselbarth, 1973a), usually reaching apex of wing; ovipositor sheath longer than hind femur; propodeal tubercle variable 13
7. Length of ovipositor sheath 1.5—2.0 times 1st metasomal tergite, which is rather weakly reticulato-rugose usually 8
— Length of ovipositor sheath 1.3 times or less 1st metasomal tergite, which is rather densely reticulato-rugose usually 9
8. Antenna very short and stout (Fig. 300), length of 3rd antennal segment ca. 1.5—2.0 times its width; stemmaticum and upper face punctato-rugose (Fig. 301, 302: forma *nidicola* Hedqvist) or smooth (nominate form) . . . . *maryi* Hellén (p. 227)
— Antenna more slender (Fig. 84 in Haeselbarth, 1973a), length of 3rd segment ca. 2.5—3.0 times its width . . . . . *instabilis* Ruthe (p. 240)
9. Propodeum almost cuboidal in lateral view, dorsal surface forming an angle of

100—110° with posterior surface; antenna of equal width (Central Asian species) 10

— Propodeum less cuboidal, rounded, angle larger; antenna usually widened apicad 11

10. Antenna rather slender (as Fig. 85 in Haeselbarth, 1973a, but not widened apicad); d 1 distinctly shorter than d 2 . . . . . *subquadratus* Papp (p. 240)

— Antenna short, stout (Fig. 89 in Haeselbarth, 1973a); d 1 about equal to d 2 . . . . . *tobiae* Haeselbarth (p. 240)

11. Pterostigma and radial cell narrow (cf. Fig. 122 in Haeselbarth, 1973a) . . . . . *leptostigma* Ruthe (p. 240)

— Pterostigma and radial cell less narrow (Fig. 78—81 in Haeselbarth, 1973a) . . 12

12. Antenna slender (Fig. 85 in Haeselbarth, 1973a), somewhat widened apicad, length of 10th segment nearly twice its width, penultimate segments somewhat longer than wide . . . . . *filicornis* Haeselbarth (p. 240)

— Antenna less slender (Fig. 86—88 in Haeselbarth, 1973a), somewhat widened apicad or not; length of 10th segment ca. 1.5 times its width; length of penultimate segments usually equal to their width . . . . . *exilis* (Nees) (p. 232)

13. Propodeal tubercle distinct, rather sharp 14

— Propodeal tubercle absent or indistinctly developed, if distinct (only in *bovistae*) then blunt 15

14. Head in frontal aspect distinctly narrowed ventrad (Fig. 71 in Haeselbarth, 1973a); width of clypeus ca. 3.0 times its height; TOL : ITL = 1 : ± 1.5; length of mesosoma ca. 1.6 times its height . . . . . *pappianus* Haeselbarth (p. 240)

— Head in frontal aspect not or indistinctly narrowed ventrad (Fig. 72 in Haeselbarth, 1973a); width of clypeus ca. 4.0 times its height; TOL : ITL = 1 : ca. 2.0; length of mesosoma ca. 1.9 times its height . . . . . *procerus* Haeselbarth (p. 241)

15. Metacarp distinctly surpassing radial cell (Fig. 68, 69 in Haeselbarth, 1973a); length of ovipositor sheath at least 1.5 times hind tibia 16

— Metacarp not surpassing radial cell (Fig. 66, 67 in Haeselbarth, 1973a); length of ovipositor sheath at most 1.3 times hind tibia 17

16. Length of 3rd antennal segment 2.5—3.0 times length of 16th (= penultimate) segment (Fig. 65 in Haeselbarth, 1973a); clypeus wide (Fig. 73, l.c.); anterior tentorial pits at level of undersides of eyes; length of malar space scarcely half time basal width of mandible; propodeal tubercle absent . . . . . *nigricornis* Haeselbarth (p. 241)

— Length of 3rd antennal segment ca. 2.0 times 16th segment; clypeus narrower; anterior tentorial pits below level of undersides of eyes; length of malar space about equal to basal width of mandible; propodeal tubercle distinct, short and blunt . . . . . *bovistae* Haeselbarth (p. 241)

17. Length of 3rd antennal segment 2.5—3.0 times 16th segment (Fig. 61 in Haeselbarth, 1973a); anterior antennal pits at level of under sides of eyes (Haeselbarth, 1973a: Fig. 74); malar suture present; maler space shorter than basal width of mandible; length of 1st metasomal tergite ca. twice its apical width; length of ovipositor sheath ca. 1.3 times hind tibia . . . . . *errans* (Nees) (p. 241)

— Length of 3rd antennal segment ca. twice 16th segment (Fig. 62, 64 in Haeselbarth, 1973a); malar suture absent or present; malar space variable; length of 1st tergite at least 2.5 times its apical width; length of ovipositor sheath 0.9—1.3 times hind tibia 18

18. Malar space somewhat longer than basal width of mandible; malar suture absent; anterior tentorial pits distinctly below level of under sides of eyes (Fig. 76 in Haeselbarth, 1973a); lateral carina of scutellum absent; length of 1st metasomal tergite ca. 2.5 times its apical width; length of ovipositor sheath ca. 1.3 times hind tibia . . . . . *stelfoxi* Haeselbarth (p. 241)
— Length of malar space ca. 0.8 times basal width of mandible; malar suture present; anterior tentorial pits only slightly below level of under sides of eyes (Fig. 75 in Haeselbarth, 1973a); lateral carina of scutellum weakly developed; length of 1st metasomal tergite ca. 3.0 times its apical width; length of ovipositor sheath ca. 0.9 times hind tibia . . . . . *hostilis* Haeselbarth (p. 241)
19. Propodeal tubercle absent; 1st discoidal cell usually rather narrowly truncate anteriorly (Fig. 54 in Haeselbarth, 1973a) . . . . . *modestus* Haeselbarth[1]) (p. 241)
— Propodeal tubercle present, short, blunt; 1st discoidal cell widely truncate anteriorly (Fig. 396) 20
20. Scutellar suture beside medial carina with distinctly developed short carinae (Fig. 372); ovipositor sheath shorter than hind tibia 21
— Scutellar suture beside medial carina smooth or with indistinctly developed rugae; ovipositor sheath as long as hind tibia or longer 22
21. Antenna very short, wide (Fig. 371), usually 5th or 6th antennal segment quadrate; length of ovipositor sheath about equal to hind femur (European species) . . . . . *paganus* Haliday (p. 238)
— Antenna somewhat more slender (Fig. 50 in Haeselbarth, 1973a); length of ovipositor sheath somewhat more than length of hind femur (Asiatic species) . . . . . *radialis* Haeselbarth (p. 241)
22. Antenna short, wide, its basal segments truncate apically, about as wide as apical segments (Fig. 48 in Haeselbarth, 1973a); hind tarsus distinctly shorter than hind tibia; frontal suture distinct; head and mesosoma usually reddish; metasoma, black . . . . . *forticornis* Haeselbarth (p. 242)
— Antenna more slender or its basal segments distinctly narrower than its apical segments; length of hind tarsus about equal to hind tibia; frontal suture absent or indistinct; whole body darkly coloured 23
23. Length of 1st metasomal tergite 1.9—2.0 times its apical width, somewhat widened apically (Fig. 397); mesoscutum less slender (Fig. 399); antenna only slightly longer than combined length of head and mesosoma (Fig. 51 in Haeselbarth, 1973a) . . . . . *humilis* (Nees) (p. 235)
— Length of 1st tergite ca. 2.6 times its apical width, sides parallel (Fig. 387); mesoscutum more slender (Fig. 386); antenna (Fig. 52 in Haeselbarth, 1973a) distinctly longer than head and mesosoma together . . *longipennis* (Gravenhorst) (p. 242)

Blacus (Blacus) maryi forma **nidicola** Hedqvist, comb. nov. (Fig. 300—305)

Hedqvist, 1974, Ent. Tidskr. 95: 184—185, Fig. 1A—D.

Because the differences with the nominate form are small sculptural differences only, the author considers them not to be of specific value until more biological evidence becomes available.

[1]) If malar suture is present, parastigma rather small and length of ovipositor sheath ca. 0.48 times fore wing, cf. *errans* (Nees) (17).

Description of a ♀ from Yukon Territory. Length of body 2.7, of fore wing 2.5 mm.

Head. — Antenna short, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 1.9 and 1.3 times their apical width, respectively, penultimate segments quadrate; area in front of occipital carina with widely spaced short crenulae; stemmaticum finely rugose (Fig. 301); frontal suture short, distinct; beside posterior ocelli a deep groove; frons smooth; vertex somewhat punctulate; POL : Ø ocellus : OOL = 4 : 2 : 8; dorsal length of eye 0.7 times temple; face superficially punctato-rugose; clypeus somewhat punctulate; malar suture wanting; length of malar space ca. 1.5 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum almost completely and distinctly reticulate; area behind prepectal carina almost smooth; epicnemial suture finely striate; precoxal suture completely and distinctly reticulate (Fig. 300); metapleural flange large; notauli shallow, completely punctato-reticulate; mesoscutal lobes slightly convex only, lateral lobes bare medially, middle lobe somewhat punctulate (Fig. 303); posterior notaulic area reticulate; scutellar suture long, deep, with one medial carina; lateral carina of scutellum absent; scutellum with closely spaced punctures, except medially (Fig. 303); propodeal tubercle small, rather indistinct; propodeum almost completely reticulate.

Wings. — Parastigma rather small; r 2 straight; d 1 : d 2 = 5 : 11; metacarp short (Fig. 300); 1st discoidal cell sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.4, 7.8 and 7.0 times their width, respectively; coxa and femur of hind leg distinctly rugose.

Metasoma. — Length of 1st tergite 1.6 times its apical width, distinctly reticulate in apical half (Fig. 305), dorsal carinae distinct in basal half only; length of ovipositor sheath 0.26 times fore wing.

Colour. — Dark reddish brown, but some parts almost black; clypeus, mandibles, anellus, legs and metasoma ventrally reddish yellow; metasoma dorsally more or less reddish; tegulae, pterostigma and palpi, brown.

Holotype in Hedqvist Collection, Stockholm: "från utgravt bo av *B. lapponicus*, T. Lpm., Abisko, 9/8.1972", "Holotypus ♀ *Blacus nidicola* sp. n. K-J. Hedqvist, det. 1974", "20/75", "Riksmuseum Stockholm". Through the kindness of Mr. Hedqvist I could examine this holotype and one paratype, both from nests of *Bombus lapponicus* F. in N. Sweden. The holotype has r 2 somewhat more curved (Fig. 1C in Hedqvist, 1974), but in the not figured left wing it is less pronounced and the scutellum is flatter (but not in the paratype). Length of 3rd antennal segment 1.3 times 4th segment, length of 3rd and 4th segments 1.8 and 1.6 times their width, respectively, apical segments almost quadrate; length of femur, tibia and basitarsus of hind leg 3.6, 6.2 and 6.5 times their width, respectively; length of ovipositor sheath 0.28 times fore wing. Further specimens examined: 2 ♀; "14 mi. E. Dawson, Y.T., 1300 (ft), 6.viii.1962, leg. P. J. Skitsko" (figured, CNC); "Ft. Churchill, Man., 28.vii.1952, J. G. Chillcott" (AC).

Blacus (Blacus) maryi forma maryi Hellén (Fig. 306—311)

Hellén, 1958, Fauna Fennica 4: 23.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 22.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 152—153, Fig. 83.

Length of body 2.4—2.6, length of fore wing 2.3—2.4 (according to Haeselbarth, l.c. to 2.6) mm; length of 3rd antennal segment 1.3 times 4th segment, length of 3rd

and 4th segments 1.8—2.0 and 1.5 times their width, respectively; stemmaticum smooth; face smooth, except for some superficial rugae near antennal sockets; precoxal suture may be more or less reduced anteriorly (Fig. 306); scutellum punctulate or almost smooth; r 2 evenly bent (in figured specimen weakly sclerotized, as metacarp); length of femur, tibia and basitarsus of hind leg 4.3—4.5, 7.8—8.5 and 6.0—7.0 times their width respectively; length of 1st metasomal tergite 1.5—1.6 times its apical width; figured specimen has tergites with margins membranous apically.

Examined ♀ specimens: "Pete Lake, B.C., 57°56′—131°56′, 16.viii.1960, W. W. Moss, 4000′ (ft)" (CNC, figured); "West Chicago Cr. 9800′ (ft), Clear Cr. Co., Colo., ii-viii.1961, B. H. Poole" (CNC), mesoscutum more setose, precoxal suture complete, length of ovipositor sheath 0.29 times fore wing; "Mc. Murray, Alta, 13.viii.1953, G. E. Ball" (AC); St. Peter im Tal Ahrntal, Südtirol, 2200 m, 26.viii.1967, det. Haeselbarth (HC).

Note. In Europe this species has a boreo-montane distribution (Haeselbarth, 1973a).

Blacus (Blacus) crassicrus spec. nov. (Fig. 312—317)

Holotype, ♀, length of body and of fore wing 2.2 mm.

Head. — Antenna moniliform, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 1.8 and 1.4 times their width, respectively, penultimate segments wider than long (Fig. 312); area in front of occipital carina distinctly crenulate; POL : Ø ocellus : OOL = 3 : 2 : 5; dorsal length of eye 0.8 times temple (Fig. 313); face and clypeus smooth as vertex and frons; frontal suture absent; length of malar space ca. 1.5 times basal width of mandible; malar suture absent.

Mesosoma. — Length of mesosoma 1.5 times its height, side of pronotum rather remotely reticulate except for dorsal fifth (Fig. 312); zone behind prepectal carina crenulate; epicnemial suture almost smooth; precoxal suture absent anteriorly, medially with a few striae (Fig. 312); mesoscutal lobes slightly convex, slender; notauli shallow, posteriorly with double groove, and almost invisible, fine crenulae; scutellar suture rather deep, with three weakly developed ridges; scutellum smooth, lateral carina absent; propodeal tubercle small, placed low; propodeum distinctly reticulate, but both triangular basal areas smooth.

Wings. — Parastigma small; r 2 slightly bent; d 1 : d 2 = 1 : 1.1; 1st discoidal cell sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.2, 8.3 and 5.8 times their width, respectively; hind coxa rugose dorso-basally, hind femur blotched.

Metasoma. — Length of 1st tergite 2.0 times its apical width, surface weakly reticulate, very convex in basal half, dorsal carinae distinct in basal two-thirds; length of ovipositor sheath 0.25 times fore wing; metasoma compressed in apical half.

Colour. — Dark blackish brown; mandible, base of scapus, pedicellus, annellus, legs and pterostigma, yellowish brown; coxae and femora darkened.

Holotype ♀ in CNC, Ottawa: "Mex., Dgo., 9000′ [ft], El Salto, 10 mi. W, 2.vii. 1964, W. R. M. Mason".

Blacus (Blacus) cohibilis spec. nov. (Fig. 318—323)

Holotype, ♀, length of body 2.5, length of fore wing 2.2 mm.

Head. — Antenna relatively slender, length of 3rd segment 1.5 times 4th segment,

length of 3rd and 4th segments 3.8 and 2.6 times their width, respectively, penultimate segments quadrate; area in front of occipital carina crenulate; frontal suture short; POL : Ø ocellus : OOL = 10 : 5 : 12; dorsal length of eye 0.6 times temple (Fig. 321); frons and vertex smooth; face smooth, except for some superficial rugosity, found below antennal sockets and near bases of mandible; clypeus smooth except some superficial punctures; malar suture absent; length of malar space ca. 1.5 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulate except dorsal fifth; zone behind prepectal carina crenulate; epicnemial suture transversely striate, ventrally more rugose; precoxal suture complete, reticulato-rugose (Fig. 318); mesoscutal lobes rather convex, only medially setose; notauli rather shallow, completely crenulate, widening apicad, resulting in a longitudinal, rugose area; scutellar suture deep, with three medium-sized carinae; scutellum reticulate apically, smooth anteriorly, lateral carina indiscernable from lateral reticulation; propodeal tubercle small, stout; dorsal surface of propodeum anteriorly nearly smooth, medial carina distinct, its posterior surface reticulate (Fig. 322).

Wings. — Parastigma small; r 2 slightly bent, almost straight; d 1 : d 2 = 1 : 2.0 (Fig. 318); 1st discoidal cell narrowly truncate, almost sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.3, 10.9 and 6.7 times their width, respectively; its femur almost smooth, its coxa reticulato-rugose dorsally.

Metasoma. — Length of 1st tergite 1.7 times its apical width, surface punctate in apical half, punctato-rugose in basal half, dorsal carinae converging, coalescent at level of spiracle; length of ovipositor sheath 0.40 times fore wing, apical half of metasoma strongly compressed.

Colour. — Brownish black; metasoma (except 1st segment), face, tegula, pterostigma, apical half of antenna and palpi, brown; mandible, base of antenna and legs, brownish red.

Holotype ♀ in CNC, Ottawa: "Ft. Davis, Texas, Limpia Cn., 5000' [ft], 30.v.1959, W. R. M. Mason".

Note. Related to the Palaearctic *errans*, but the latter has malar space shorter (Fig. 74 in Haeselbarth, 1973a), anterior antennal pits between eyes, 1st discoidal cell wider (Haeselbarth, 1973a, Fig. 67), nervulus more basal and 1st metasomal tergite less slender.

Blacus (Blacus) asaphus spec. nov. (Fig. 324—330)

Holotype, ♀, length of body 1.9, length of fore wing 1.8 mm.

Head. — Antenna rather slender, length of 3rd antennal segment 1.4 times 4th segment, length of 3rd and 4th segments 3.0 and 2.1 times their width, respectively, penultimate segments somewhat longer than their width; area in front of occipital carina almost smooth; POL : Ø ocellus : OOL = 3 : 2 : 4; dorsal length of eye 0.9 times temple (Fig. 325); face, clypeus, frons and vertex smooth; malar and frontal sutures absent; length of malar space about twice basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulate; zone behind prepectal carina somewhat crenulate, indistinct; epicnemial suture finely striate; precoxal suture narrow, almost smooth (Fig. 324); mesoscutal lobes rather convex; notauli shallow, complete, punctate; scutellar suture deep, with one medial

carina distinct only; scutellum smooth, its lateral carina complete, distinct; propodeal tubercle small; propodeum finely reticulate except for both basal narrow smooth areas.

Wings. — Parastigma small; r 2 evenly bent; d 1 : d 2 = 1 : 1.1; cu 1 and veins of hind wing less sclerotized than other veins; 1st discoidal cell sharp anteriorly or nearly so.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.2, 10.3 and 6.0 times their width, respectively; hind femur smooth; hind coxa rugose dorso-basally.

Metasoma. — Length of 1st tergite 1.4 times its apical width, whole surface reticulate, dorsal carinae distinct in basal half, flattened and widened apicad; length of ovipositor sheath 0.18 times fore wing, distinctly shorter than hind femur.

Colour. — Dark reddish brown; basal half of antenna, palpi, legs and pterostigma, yellowish.

Holotype ♀ in CNC, Ottawa: "5 mi. S.W. Shilo, Man., 13.viii.1953, J. G. Chillcott". Paratypes: "Lockeport, N.S., 31.vii.1958, leg. J. R. Vockeroth" (AC), length of body 1.5 mm, length of 3rd segment 1.6 times 4th segment of antenna; "Swift Current, Sask., 16.ix.1940, A. R. Brooks" (CNC); id., but 17.ix.1940 (CNC); "Winnipeg, Man., Sep. 10, 1942, S. Buckwold" (AC).

Note. Much resembles *exilis* and *filicornis* but differs by the shape of the 1st metasomal tergite. Differs from *rufipes* by more convex clypeus, flatter 1st metasomal tergite and shorter temples.

Blacus (Blacus) cognatus spec. nov. (Fig. 331—336)

Holotype, ♀, length of body and of fore wing 2.3 mm.

Head. — Antenna moderately stout, length of 3rd segment 1.3 times 4th segment; length of 3rd and 4th segments 3.1 and 2.5 times their width, respectively, penultimate segments somewhat longer than their width; area in front of occipital carina crenulate; POL : Ø ocellus : OOL = 4 : 2 : 4; dorsal length of eye 0.9 times temple (Fig. 334); face, clypeus, vertex and frons smooth; frontal and malar sutures absent; length of malar space ca. 1.5 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum reticulato-rugose, except for dorsal one-tenth; zone behind prepectal carina crenulate; epicnemial suture with some striae; precoxal suture narrow, rugose (Fig. 331); mesoscutal lobes rather convex; notauli deep, finely crenulate, posteriorly forming a triangular, longitudinally striate area; scutellar suture deep, with three medium-sized carinae; scutellum smooth, its lateral carina incomplete and almost invisible; propodeal tubercle small, sharp; dorsal surface of propodeum finely transversely wrinkled, rugose, except for both small areas basally (Fig. 333).

Wings. — Parastigma small; r 2 bent basad but apical half straight; d 1 : d 2 = 1 : 0.7; 1st discoidal cell sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.6, 10.0 and 8.0 times their width, respectively; hind femur weakly rugose; hind coxa reticulato-rugose dorso-basally.

Metasoma. — Length of 1st tergite 1.5 times its apical width, striato-reticulate, dorsal carinae almost complete, posteriorly with smooth, distinct tubercle; length of ovipositor sheath 0.22 times fore wing.

Colour. — Dark reddish brown; antenna (except basal half), tegulae, metasoma

(except 1st tergite), palpi and pterostigma, light brown; legs, mandible and basal half of antenna, brownish yellow; coxa darkened.

Holotype ♀ in CNC, Ottawa: "Ramsey Cyn., 6000′ (ft), 15 mi. S. Sierra Vista, Huachuca Mts., Ariz., Sternizky, 10.v.1967". Paratypes: 1 ♀, "Indian Head, Sask., 6.ix.1927, Kenneth Stewart" (AC); 1 ♀, "State Nurs., Boscobel Grant Co., Wisc., USA, vi-12-1953, coll. R. D. Shenefelt", "light trap Barber's Sol", 1st metasomal tergite finely reticulate, as *rufipes* but with slender shape of *cognatus* (SC); 2 ♀ from Wood Co., Wisc., Nekoosa, ix-1-1948, W. W. Barrett, light trap (AC, SC), propodeal tubercle relatively indistinct and 1st tergite somewhat less slender.

Note. From the type-locality one ♂ (25.vi.1967) which is almost certainly conspecific, antennal segments 21.

Blacus (Blacus) defectuosus Provancher (Fig. 337—345)

Provancher, 1886, Addit. Faune Can.: 133.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.

Holotype, ♀, length of body 2.7, length of fore wing 2.5 mm.

Head. — Antenna relatively slender, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 3.7 and 2.6 times their width, respectively (in other specimens examined 2.9—3.3 and 1.9—2.4 times, respectively), apical segments broken off (but in specimens examined penultimate segments somewhat longer than wide (Fig. 343)); area in front of occipital carina finely crenulate; dorsal length of eye 0.9 times temple; frontal suture short, indistinct; POL : Ø ocellus : OOL = 5 : 3 : 7; frons, vertex and clypeus smooth, face nearly smooth (in other specimens often transversely rugose below antennal sockets); malar suture indistinct, almost absent; length of malar space ca. 1.5 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum rather weakly reticulato-rugose, except for dorsal fifth (Fig. 337); zone behind prepectal carina crenulate; epicnemial suture almost smooth; precoxal suture complete, rather narrow and weakly reticulato-rugose (Fig. 337); mesoscutal lobes rather convex; notauli complete, rather deep and crenulate, with small rugose area apically; scutellar suture deep, with one carina besides some rugosity; scutellum smooth but apical third reticulato-rugose, its lateral carina present basally only; propodeum transversely rugose dorsally, medial carina distinct and both basal areas smooth; propodeal tubercle small, rather sharp, relatively blunt as compared to *cognatus*.

Wings. — Parastigma rather small; r 2 distinctly bent basally and slightly sinuate apically; d 1 : d 2 = 1 : 1.3; 1st discoidal cell more or less narrowly truncate anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 6.9, 10.9 and 9.0 times their width, respectively, its femur superficially rugulose, its coxa reticulato-rugose dorsobasally.

Metasoma. — Length of 1st tergite 1.5 times its apical width, flattened apicad, surface reticulato-rugose medially but apical fifth almost smooth, especially lateral parts, dorsal carinae distinct in basal half, spiracle protruding; length of ovipositor sheath 0.23 times fore wing.

Colour. — Reddish brown; antenna, palpi, 2nd and 3rd metasomal tergites, hind coxa and ovipositor sheath, brownish yellow; pterostigma, tegulae, mandible and legs (except hind coxa), yellow.

Holotype ♀ in PC, Quebec: "734/1287" (from Ottawa).

Specimens examined: all ♀ ; Sask., Saskatoon and Swift Current, 7, 9 and 17 ix.1940; Utah, Garfield Co., Escante, light trap, 15.vii.1958; Colo., Denver Fed. Center, light trap, 22.vi.1958; Ont., Moose Factory, 27.viii.1959 (CNC, SC, AC). A ♀ from Wood Co., Wis., Ft. Edwards, 7.ix.1948, light trap (SC) has relatively slender antenna and propodeal tubercle indistinct.

Blacus (Blacus) rufipes (Ashmead) (Fig. 346—351)

Ashmead, (1888) 1889, Proc. U.S. natn. Mus. 11: 626 (as *Dimeris*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 24.

Holotype, ♀, length of body 2.5 (—2.6 in figured specimen), length of fore wing 2.4 (—2.5) mm.

Head. — Antenna relatively slender, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 2.8 (—3.0) and 2.0 (—2.4) times their width, respectively, apical segments in both specimens broken off; area in front of occipital carina finely crenulate; POL : Ø ocellus : OOL = 6 : 2 : 6; dorsal length of eye 0.7 times temple (Fig. 347); clypeus, frons and vertex smooth; face smooth but with some micro-sculpture near antennal sockets; frontal and malar sutures absent; length of malar space ca. twice basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height, side of pronotum reticulate except for dorsal margin; zone behind prepectal carina crenulate; epicnemial suture striate; precoxal suture complete, distinctly rugose (in figured specimen rather shallow, Fig. 346); mesoscutal lobes slightly convex, somewhat punctulate in holotype only; notauli complete, rather shallow, almost smooth, except for some micro-sculpture, widened apicad; scutellar suture deep, one distinct and two weaker and shorter carinae; scutellum smooth, its lateral carina absent except for some remains apicad; propodeal tubercle small, sharp; dorsal surface of propodeum finely reticulato-rugose, medial carina distinct and both basal areas smooth (Fig. 351).

Wings. — Parastigma small; r 2 slightly bent basad (in figured specimen more distinct than in holotype); d 1 : d 2 = 1 : 1 (—1.7); 1st discoidal cell sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.6 (—5.4), 8.4 (—10.5) and 7.0 (—8.7) times their width, respectively; hind femur rugose; hind coxa reticulato-rugose dorso-basally.

Metasoma. — Length of 1st tergite 1.4 (—1.5) times its apical width, rather flattened medially, finely and closely reticulate (figured specimen with smooth apical tubercle, not in holotype), dorsal carinae rather indistinct, visible in basal third only; length of ovipositor sheath (0.19-)0.22 times fore wing.

Colour. — Dark reddish brown; head, antenna, legs and metasoma (except 1st tergite), reddish; palpi whitish; tegulae apically and pterostigma, light brown.

Holotype ♀ in USNM, Washington: "69", "May Webster", "unique", "Thro C. V. Riley 1888", "type", "collection Ashmead", "Type No. 58841 USNM", "*Dimeris rufipes* Ashm". The type-locality is Indiana.

Specimen figured: "Swift Current, Sask., 18.ix.1940, A. R. Brooks" (CNC).

Note. Differs from the Palaearctic *pappianus* by shorter ovipositor sheath, smaller propodeal tubercle, and more robust first metasomal tergite. Differs from *maryi* by the relatively slender antenna and apically sharper and larger propodeal tubercle.

Blacus (Blacus) exilis (Nees) (Fig. 352—363)

Nees von Esenbeck, (1811) 1812, Mag. Ges. nat. Fr. Berl. 5: 19 (as *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 19—20.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 61: 157—161, Fig. 79—81, 86—88, 116, 121.
Fitch, (1854) 1855, Trans. N.Y. St. agric. Soc. 14: 840 (*Aphidius lactucaphis*). Syn. nov.
Foerster, 1862, Verh. naturh. Ver. preuss. Rheinl. 19: 237 (*Miocolus pallipes*) (nec Haliday, 1835, Ent. Mag. 3: 41).
Ashmead, 1905, in: Nason, Ent. News 16: 294 (*Blacus nanus*), nom. nud. Syn. nov.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23 (*Blacus propallipes*).

A very variable Holarctic species. ♀ length of body 1.6—2.2, length of fore wing 1.6—2.4 mm.

Head. — Antenna moderately stout, length of 3rd segment 1.2—1.5 times 4th segment, length of 3rd and 4th segments 2.3—2.8 and 1.7—2.2 their width, respectively; length of penultimate segments about equal to or somewhat more than their width; area in front of occipital carina crenulate; POL : Ø ocellus : OOL = 3.5—6 : 2 : 3—6; dorsal length of eye 0.7 times temple (Fig. 359); frons, vertex, clypeus and face smooth; malar and frontal sutures absent; length of malar space ca. twice basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum almost smooth dorsally, with weak rugae ventrad; zone behind prepectal carina crenulate; epicnemial suture almost smooth, except for some striae dorsally; precoxal suture narrow, shallow, often reduced (Fig. 358, 352); mesoscutal lobes slightly convex; notauli rather deep, crenulate, often weakly developed; scutellar suture rather deep, with one distinct and two less developed and shorter carinae; scutellum smooth, but apical 0.3 finely reticulate, its lateral carina more or less distinctly developed; propodeal tubercle small, sharp; dorsal surface of propodeum smooth basally, posteriorly shallowly sculptured.

Wings. — Parastigma small; r 2 evenly bent; d 1 : d 2 = 1 : 1.0—1.3 (but specimen from Payne Bay 1 : 3.8, Fig. 352); 1st discoidal cell more or less sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.6—5.8, 9.0—10.6 and 7.2—9.0 times their width, respectively; hind femur almost smooth; hind coxa rugose dorso-basally.

Metasoma. — Length of 1st tergite 1.6 times its apical width, surface distinctly reticulate, with apical tubercle smooth, dorsal carinae distinctly developed in basal four-fifths; length of ovipositor sheath 0.20—0.24 times fore wing.

Colour. — Reddish or dark brown; mandible, palpi, antenna and legs, brownish yellow (some specimens also metasoma except for 1st tergite); pterostigma brown.

Specimens examined: Nearctic: all ♀; Colorado (Summit L., 12,800 ft, Mt. Evans); Illinois (Algonquin); North Carolina (Highlands); Iowa (Sioux City, figured); Wisconsin (Door Co; Sturgeon Bay; Nekoosa; Douglas Co., Gordon Nusery; Dane Co.; Cranmore); Quebec (Harrington L.; Lanicle); Ontario (Ottawa; Trenton; Innisville); British Columbia (Cowichan L.).

Aberrant specimens: Payne Bay, Quebec, 2.viii.1958, W. R. M. Mason (Fig. 352—357); Summit Lake, British Columbia, mi 392 Alaska Hwy, 19-21.viii.1958, 4200 ft, R. E. Leech and from Alaska, Kotzebue, 420′ (ft), 14.viii.1958, Lindroth. The latter specimen has the 1st discoidal cell petiolate and r 2 straight.

Distribution in Palaearctic region. In the Netherlands common at Waarder, Zuid-Holland; seldom collected in a holm at Asperen (Zuid-Holland) and Oostwold (Gro-

ningen). Snellen van Vollenhoven (1876: 240) recorded it from Naaldwijk (Zuid-Holland). From France a large series (22 ♀, 31 ♂) was examined from a mouldy grass heap with many Staphylinidae (Dordogne, Cénac, St. Julien, 23.vi-15.vii.1974, P. Kanaar). Specimens with antenna as in *filicornis* occur together with typical *exilis* and intermediate specimens (numbers of ♀: 6, 9 and 5, respectively). See note under *filicornis*.

Notes. The only biological evidence in the Nearctic region is indirect: Ex Douglas fir cone or from cones of *Tsuga heterophylla* (Cowichan L., British Columbia, 19 and 22.ix.1958 and 20.ix.1940); in hollow sumac (= *Rhus* spec., Ottawa, Ontario, 4.x. 1970); one ♀ (Quaintance No. 5791) in USNM bred from No. 5702 (?). 1 ♀ in SC (Dane Co., Wisconsin, xii.1, 1956, coll. P. A. Jones) was collected indoors, which indicates that the adult ♀ hibernate; this is also known from the European literature.

The holotype of *lactucaphis* is a ♂ of *exilis* with 19 antennal segments. It bears the labels: "Type No. 1821 USNM", "From Fitch collection", "*Aphidius lactucaphis*" and *Blacus lactucapis* (sic!) Fitch". The type locality is New York.

The No. 15771 of the Ashmead Collection bears a MS-label "*Blacus nanus* Ashm., ♀" which almost certainly refers to the nomen nudum published by Ashmead in Nason (1905).

Blacus (Blacus) apodastus spec. nov. (Fig. 364—370)

Holotype, ♀, length of body 2.3, length of fore wing 1.9 mm.

Head. — Antenna relatively slender, length of 3rd segment 1.1 times 4th segment, length of 3rd and 4th segments 2.6 and 2.2 times their width respectively, penultimate segments longer than wide; dorsal length of eye 0.9 times temple; POL : Ø ocellus : OOL = 4 : 1 : 5; frontal and malar sutures absent; narrow area in front of occipital carina crenulate; clypeus, vertex and frons smooth; face smooth but near antennal sockets somewhat rugose; malar space somewhat longer than basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulate except dorsal fifth; zone behind prepectal carina with one short carina only; epicnemial suture finely, longitudinally punctato-rugose; precoxal suture complete, finely punctato-rugose (Fig. 364); metapleural flange scarcely visible, blunt; notauli crenulate in basal half, almost smooth apically; length of scutellar suture almost equal to its width (Fig. 369), rather deep, with one weakly developed carina; scutellum smooth, its lateral carina absent; propodeal tubercle small, blunt; propodeum almost smooth anteriorly, reticulate posteriorly, with two closely situated, parallel medial carinae (Fig. 370).

Wings. — Parastigma rather large; r 2 slightly bent, slightly sclerotized apicad; d 1 : d 2 = 4 : 15; 1st discoidal cell widely truncate anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.6, 8.3 and 7.5 times their width, respectively; hind femur almost smooth, hind coxa finely reticulate dorsally.

Metasoma. — Length of 1st tergite 1.6 times its apical width, longitudinally punctato-rugose, flattened apicad, dorsal carinae distinct in basal two-fifths; length of ovipositor sheath 0.40 times fore wing.

Colour. — Dark brown; metasoma and antenna largely, face and pterostigma, brown; legs, mandible, palpi and tegulae, yellowish brown; wing veins weakly coloured, only costa and pterostigma brown.

Holotype ♀ in CNC, Ottawa: "Innisville, Ont., 25.vii.1963, W. R. M. Mason".

Note. Related to the Palaearctic *leptostigma*, but the latter species has a smaller parastigma and anteriorly sharp 1st discoidal cell (Fig. 122 in Haeselbarth, 1973a).

Blacus (Blacus) masoni spec. nov. (Fig. 378—384)

Holtoype, ♀, length of body 3.7, length of fore wing 3.3 mm.

Head. — Antenna moderately slender, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 2.0 and 1.6 times their width, respectively, penultimate segments distinctly longer than wide; dorsal length of eye 0.6 times temple; POL : Ø ocellus : OOL = 7 : 3 : 7; frontal suture shallow; vertex distinctly punctulate; frons and clypeus remotely punctulate; face distinctly punctato-rugose, medially and laterally less developed (Fig. 381); malar suture absent; area in front of occipital carina crenulate; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.5 times height; side of pronotum reticulate except for dorsal third; zone behind prepectal carina crenulate; epicnemial suture reticulato-rugose; precoxal suture deep, distinctly rugoso-reticulate; metapleural flange medium-sized; notauli narrow, finely punctato-crenulate; mesoscutal lobes punctate, apical margin sinuate (Fig. 379); scutellar suture subtriangular, with three carinae; scutellum punctulate, its lateral carina absent; propodeal tubercle rather large, propodeum with both basal areolae smooth, posterior surface reticulate.

Wings. — Parastigma large; r 2 straight; d 1 : d 2 = 8 : 18; 1st discoidal cell widely truncate anteriorly; aqu 1 (and sometimes 2) weakly indicated.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.4, 8.3 and 8.3 times their width, respectively; hind femur superficially reticulato-rugose; hind coxa reticulate dorso-anteriorly.

Metasoma. — Length of 1st tergite 1.5 times its apical width, smooth except for some lateral and apical microsculpture (Fig. 380), dorsal carinae almost absent; apical tergites with narrow membranous margins; length of ovipositor sheath 0.26 times fore wing.

Colour. — Brownish black; scapus, pedicellus, annellus, palpi, mandible and labrum, brownish yellow; clypeus, tegulae, pterostigma and metasoma, brown.

Holotype ♀ in CNC, Ottawa: "Quebec, Old Chelsea, Summit King Mt., 1150 (ft), 22.viii.1965, J. R. Vockeroth", "*Blacus* s.l., primitive, note 2 anals in f.w., det. W. R. M. Mason 73". Paratypes: "B.C., Gagnon Rd., 6 mi. W. Terrace, 13.vii.1960, G. E. Shewell" (AC); "B.C., Hixon, 25.vii.1965, E. D. A. Dyer" (CNC); "Colo., Doolittle Ranch, 9800 (ft), Mt. Evans, 3.viii.1961, C. H. Mann" (CNC); "Wis., Vilas Co., Trout Lk, Nursery, 29.viii.1957, R. D. Shenefelt" (SC); "Alta., Edmonton, 14-17.viii. 1949, W. R. M. Mason" (2 ♀, CNC, AC); "Robson, B.C., 10-16.vii.1947, H. R. Foxlee" (CNC); "Oberon Man., reared from nest of *Bombus ternarius* (in lab), 22.ix. 54, T. V. Cole" (AC); "Brandon, Man., T. V. Cole, reared from colony *B. ternarius*, 25.x.54 (in lab)" (CNC).

It is a great pleasure to dedicate this species to Dr. W. R. M. Mason for his substantial help in many ways.

Blacus (Blacus) humilis (Nees) (Fig. 396—432)

Nees von Esenbeck, (1811) 1812, Mag. Ges. nat. Fr. Berl. 5: 19, Fig. (as *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 128—130, Fig. 46, 51, 55.
Haliday, 1835, Ent. Mag. 3: 122 (*Blacus trivialis*).

Described after figured specimen from White Fox, Sask, ♀, length of body 2.3, length of fore wing 2.2 mm.

Head. — Antenna moderately slender, length of 3rd segment 1.1 times 4th segment, length of 3rd and 4th segments 2.3 and 1.9 times their width, respectively, penultimate segments slightly longer than wide; dorsal length of eye 0.7 times temple; POL : Ø ocellus : OOL = 9 : 4 : 10; frontal and malar sutures absent; area in front of occipital carina crenulate; frons, vertex and clypeus smooth; face superficially rugose partially (Fig. 401); length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum largely reticulate; zone behind prepectal carina crenulate; epicnemial suture longitudinally reticulato-rugose, as precoxal suture (Fig. 396); metapleural flange large; notauli crenulate anteriorly, nearly smooth posteriorly; scutellar suture reticulato-rugose, wide, deep, with three weakly developed carinae; scutellum smooth, its lateral carina indistinct; propodeal tubercle small; surface of propodeum largely reticulate.

Wings. — Parastigma rather large; r 2 almost straight; d 1 : d 2 = 10 : 16; 1st discoidal cell wide anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.4, 9.2 and 7.4 times their width, respectively; hind femur pimply; hind coxa rugose dorsally.

Metasoma. — Length of 1st tergite 1.8 times its apical width, finely reticulate, dorsal carinae distinct in basal third; length of ovipositor sheath 0.33 times fore wing.

Colour. — Dark brown; palpi, labrum, mandible, antenna basally, tegulae and legs, yellowish brown; pterostigma brown.

Specimens examined from Saskatchewan (White Fox: Fig. 396, 397, 400—403); California (Sta. Cruz: Fig. 404—409, slender mesoscutum and smooth face); West Virginia (Cacapon: Fig. 410, 411, 414, 415, 418); New York (Cranberry Lake: Fig. 426—432); Mexico (W. La Cuidad, 7000 ft: Fig. 419—425; N. Bochil, 7000 ft (very slender 1st tergite and blackish antenna); El Salto, 9000 ft); Arizona (Ramsey Cyn., 6000 ft); Oregon (Hillsboro); Colorado (West Chicago Cr., 9800 ft); New Hampshire (Alpine Garden, 5200—5600 ft); North Carolina (Gr. Smoky Mts., 5200 ft); Wisconsin Nekoosa, partly at light); British Columbia (Hixon; Terrace; Robson); Alberta (Banff, 4700 ft; Lancester Park; Aspen Beach); Ontario (Sittsville, Maynooth; Island Fall); Quebec (Old Chelsea, 1150 ft: Fig. 412, 416, 417; Nomingue); North West Territories (Norman Walls); Alaska (Unalakeet) (USNM, CNC, SC, AC).

Notes. The material was mostly collected in August and, less frequently, in June, July, September and October.

This species can be separated from the Palaearctic *longipennis* by the shape of the 1st metasomal tergite (Fig. 417 versus Fig. 387) and of the mesonotum (Fig. 414 versus Fig. 386).

The variation in the material is considerable: length of 3rd antennal segments 1.1—1.3 times 4th segment; length of 3rd and 4th segments 2.2—2.9 and 1.9—2.2 times their width, respectively; length of mesosoma 1.4—1.5 times its height; length of femur, tibia and basitarsus of hind leg 4.6—5.1, 8.2—10.4 and 7.3—8.2 times their width, respectively; length of 1st tergite 1.9—2.2 times its apical width; length of body 2.2—2.7 mm; length of fore wing 2.1—2.3 mm; length of ovipositor sheath 0.32—0.43 times fore wing.

I have thoroughly tried to split up this complex but no satisfactory separation into species was possible; to indicate the variability some forms are figured.

The Palaearctic specimens examined usually have the 1st tergite somewhat less slender (Fig. 398).

In the Netherlands the species is rather common in the middle of the country: Otterlose Bos (probably ex *Cryptophagus lycoperdi*), Putten, Rhenen (from mushroom) and Ede (all Gelderland) and Drunen (Noord-Brabant), found together with *C. lycoperdi* in mushroom.

Blacus (Blacus) caduceus spec. nov. (Fig. 385, 390—395)

Holotype, ♀, length of body 2.8, length of fore wing 2.7 mm.

Head. — Antenna stout, length of 3rd segment 1.5 times 4th segment, length of 3rd and 4th segments 2.2 and 1.5 times their width, respectively, penultimate segments quadrate or transverse (Fig. 390); dorsal length of eye 0.7 times temple; POL : Ø ocellus: OOL = 10 : 7 : 11; frontal and malar sutures absent; area in front of occipital carina distinctly crenulate; frons, vertex and clypeus smooth; face transversely rugose; length of malar space about equal to basal width of mandible.

Mesosoma. — Length of mesosoma 1.5 times its height; side of pronotum reticulate, except for dorsal one-fifth; zone behind prepectal carina crenulate; epicnemial suture rugoso-reticulate; precoxal suture wide anteriorly, distinctly rugoso-reticulate (Fig. 390); metapleural flange large; notauli crenulate basad but indistinct apically (Fig. 385); scutellar suture wide, rather shallow, with one distinctly and two weakly developed carinae, surrounded by rugae (Fig. 385); scutellum smooth, its lateral carina indistinct (but in some paratypes more distinct), slightly protruding apically; propodeal tubercle large, rather blunt; propodeum reticulate.

Wings. — Parastigma large; r 2 slightly bent; d 1 : d 2 = 13 : 25; 1st discoidal cell rather widely truncate anteriorly; aqu 1 weakly developed.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.2, 8.1 and 5.3 times their width, respectively; hind coxa and femur rugose.

Metasoma. — Length of 1st tergite 1.7 times its apical width, longitudinally reticulato-rugose, dorsal carinae distinct in basal 0.2; length of ovipositor sheath 0.46 times fore wing (in large specimens it may be 0.40—0.42 times).

Colour. — Dark brown; basal half of antenna, clypeus, labrum, mandible and tegulae, brownish yellow; palpi whitish yellow.

Holotype ♀ in USNM, Washington: "Lost River St. Pk., Hardy Co., W. Virginia, Aug. 1-14, 1960, Karl V. Krombein". Paratypes (all ♀): from: Ohio (Jerusalem); Pennsylvania (No. 2015 in Baker Coll.); Arkansas (Hot Springs Nat. Park); South Dakota (Hill City, light trap, length of body 3.5 mm); New Hampshire (Durhan (black light trap, length of body 3.1 mm)); British Columbia (Oliver; Keremeos (1600 ft, 1st tergite finely rugose); Lac la Hache (2800 ft, as Keremeos specimen); Lytton (800 ft, mesoscutum and mesosternum reddish)); Alberta (Johnston Canyon (4700 ft)); Michigan (Norway); Georgia (Rabun Co.); North Carolina (Highlands (some have dorsal carinae of 1st tergite reduced, others almost complete)); Colorado (West Chicago Cr., Clear Cr. Co. (9800 ft, length of ovipositor sheath 0.37 times fore wing, length of 1st tergite 1.5 times its apical width, length of body 3.4 mm)); Illinois (White Heath (antenna somewhat more slender)); Delaware (Wilmington (antenna somewhat more slender)); Oregon (Indian Ford, 6 mi. N.W. Sisters Deschutes Co. (3200 ft, black light)); Washington (D.C.) (at light); Wisconsin (Wood Co., Griffith St.

Nursery, Port Edwards (at light) and Nekoosa; Waupaca ("from forest floor" or "from oak understory"); Douglas Co., Gordon Nursery)); Quebec (Parke Reserve, Old Chelsea); Virginia (Mountain L.); Wyoming (Teton Pass) (USNM, CNC, SC, AC, HC, BM).

Notes. Males examined, probably belonging to this species, have 20 antennal segments, from California (Bass Lake) and Virginia (Falls Church). Paratypes were mostly collected in August, less frequently in July, September and October and seldom in June.

The variation in the paratypes is considerable; length of 3rd antennal segment 1.3—1.5 times 4th segment; length of 3rd and 4th segments 2.2—2.7 and 1.5—2.0 times their width, respectively; length of ovipositor sheath 0.37—0.45 times fore wing; length of femur, tibia and basitarsus of hind leg 3.9—4.8, 8.0—8.8 and 5.0—6.3 times their width, respectively; specimens from the western part of the continent may have a reddish mesoscutum and mesosternum partially. The size of the wings and, in lesser degree, legs and antennae are related to the size of the specimen, but in this species the size of the ovipositor varies only slightly. This is the reason why in this species large specimens have a relatively short ovipositor sheath as compared to fore wing. The species is characterized by the wide and truncate antennal segments (best observed at 3rd to 6th segments), the nearly always smooth apical area of 1st tergite of metasoma, the length of the ovipositor sheath being about equal to hind tibia or somewhat longer, and the distinct row of setae on the hind basitarsus.

Through the kindness of Dr. Haeselbarth I could examine a paratype of the related Palaearctic *forticornis* ("?Dyrhavn, Koch, 29.9.1880, coll. Schlick"). That species has the 1st discoidal cell wider, propodeal tubercle distinctly below level of dorsal surface of propodeum, face less sculptured, 1st metasomal tergite distinctly reticulate, antenna less moniliform apically, and ovipositor shorter, while the length of ovipositor sheath measures 0.32 times fore wing. Dr. Haeselbarth also considers it to be a distinct species (in litt.: "Dies ist also allem Anschein nach eine andere Art").

Blacus (Blacus) paganus Haliday (Fig. 371—377, 388, 389)

Haliday, 1835, Ent. Mag. 3: 122.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 124—125, Fig. 53, 117.
Ruthe, 1861, Berl. Ent. Z. 5: 146 (*Blacus brevicornis*).

Description of the Nearctic form, which has the 1st tergite wider and less sculptured (Fig. 373 versus Fig. 389). ♀, length of body ca. 2.8 mm, length of fore wing ca. 2—7 mm, according to Haeselbarth 2.5—3.5 mm.

Head. — Antenna stout, length of 3rd segment 1.1—1.2 times 4th segment; length of 3rd and 4th segments 1.7—1.8 and 1.4—1.6 times their width, respectively, penultimate segments quadrate or somewhat transverse; dorsal length of eye 0.5 times temple; POL : Ø ocellus : OOL : = 6 : 5 : 7 in figured specimen; area in front of occipital carina crenulate; frontal suture present; malar suture absent; frons, clypeus and vertex smooth; face punctato-rugose medially; malar space somewhat shorter than basal width of mandible.

Mesosoma. — Length of mesosoma 1.5 times its height; side of pronotum reticulate except for dorsal fifth; zone behind prepectal carina crenulate; epicnemial suture reticulato-rugose as precoxal suture, the latter rather weakly developed anteriorly and

posteriorly (Fig. 371); metapleural flange wide; notauli crenulate anteriorly, shallow medially and rugose posteriorly; mesoscutal lobes punctulate; scutellar suture wide, deep, with five medium-sized carinae; scutellum smooth except for some scarcely visible punctulation, its lateral carina complete; propodeal tubercle medium-sized, compact; propodeum superficially reticulato-rugose (more distinct in Palaearctic form), reticulate posteriorly and laterally.

Wings. — Parastigma large; r 2 almost straight; d 1 : d 2 = 6 : 13 in figured specimen; 1st discoidal cell rather widely truncate anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 3.7—4.1, 7.4—8.2 and 3.9—6.0 times their width, respectively; hind coxa rugose; hind femur almost smooth.

Metasoma. — Length of 1st tergite 1.4—1.5 times (1.7—1.9 times in Palaearctic form) its apical width, superficially reticulate, flattened apically, dorsal carinae distinct in basal fifth; length of ovipositor sheath 0.22—0.24 times fore wing.

Colour. — Brown; basal three antennal segments, palpi, legs (except for middle and hind coxae), tegulae, veins and pterostigma, yellowish.

Specimens examined of Nearctic form: (all ♀) British Columbia (Hixon; Cowichan L.); Alberta (Aspen Beach; Banff, 4700 ft.); Quebec (Cape Rouge; Old Chelsea); Georgia (Rabin Bald, 4200 ft); North Carolina (Highlands, 4100 ft; Wayah Bald, 5300 ft; Looking Glass Rock, 2500 ft) (CNC, AC, SC).

Specimens examined of Palaearctic form: Norway (Selva, nr. Trondheim) and the Netherlands (Waarder (Zuid-Holland); Wijster (Drente)).

Notes. The Nearctic form may show clinal variation; because of the lack of specimens from the northern Nearctic region I cannot yet decide to give this form specific rank.

The Palaearctic form has the 1st metasomal tergite more slender, and distinctly reticulate and convex apically (Fig. 389), while the scutellum is relatively wider (Fig. 388).

This species seems to prefer wet habitats: it was collected in considerable numbers in a small, rather wet *Alnus* forest (Waarder) and near a small creek with *Betula* spec. (Selva).

Blacus (Blacus) rufescens Ruthe

Ruthe, 1861, Berl. ent. Z. 5: 141.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 25.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 147—148, Fig. 90, 118, 120.
Thomson, 1895, Opusc. Ent. 16: 1735 (*Blacus spinifer*).

This rarely collected species, of which the ♂ is characterized by the large parameres, is not uncommon at Waarder (Zuid-Holland), Netherlands.

Blacus (Blacus) interstitialis Ruthe

Ruthe, 1861, Berl. ent. Z. 5: 150.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 19.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 135—136, Fig. 59, 63.
Fisher, 1963, Z. angew. Zool. 50: 206—208, Fig. 9—11 (*Blacus oscinellae*).

Dutch specimens examined from Waarder (Zuid-Holland) and Putten (Gelderland).

Blacus (Blacus) hastatus Haliday

Haliday, 1835, Ent. Mag. 3: 21.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 20.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 137—138, Fig. 57, 58.
Ruthe, 1861, Berl. ent. Z. 5: 142 (*Blacus terebrator*).

Specimens examined from the Netherlands are from Waarder, Meijendel (both Zuid-Holland) and Wijster (Drente).

Blacus (Blacus) instabilis Ruthe

Ruthe, 1861, Berl. ent. Z. 5: 149.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 153—155, Fig. 77, 84.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 153 (*Blacus petiolatus*).

This species is not known from the Netherlands.

Blacus (Blacus) subquadratus Papp

Papp, 1971, Annls. hist.-nat. Mus. natn. Hung. 13: 307.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 156—157.

Only holotype from Mongolia known.

Blacus (Blacus) tobiae Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 162—163, Fig. 89.

Known from Kasachstan and Turkmenia, USSR.

Blacus (Blacus) leptostigma Ruthe

Ruthe, 1861, Berl. ent. Z. 5: 152.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21—22.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 161—162, Fig. 122.

According to Haeselbarth (1973a: 162) this species may be an aberrant form of *exilis* or *filicornis*. It is only known from Germany and Ireland.

Blacus (Blacus) filicornis Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 155—156, Fig. 78, 85.

This common species may be expected in the Netherlands. It is not clear whether this species is really distinct from *exilis*. Specimens with typical *filicornis*-antenna but without doubt belonging to *exilis* do occur (see *B. exilis*). The length of the ovipositor sheath may be distinctive: in examined paratype ca. 0.11 times fore wing (ca. 0.20 times in *exilis*).

Blacus (Blacus) pappianus Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 148—149, Fig. 70—71, 91, 115, 119.

Species known from Central and E. Europe.

Blacus (Blacus) procerus Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 149—150, Fig. 72, 82.

Holotype from Kasachstan (USSR) and a ♂ from Mähren (Czechoslovakia).

Blacus (Blacus) nigricornis Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 141—142, Fig. 65, 68, 73.

In the Netherlands wide-spread: I have examined specimens from Meijendel, Leiden, Asperen (all Zuid-Holland), Putten (Gelderland) and Wijster (Drente).

Blacus (Blacus) bovistae Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 145—146, Fig. 69.

Species known from Central Europe.

Blacus (Blacus) errans (Nees)

Nees von Esenbeck, (1811) 1812, Mag. Ges. nat. Fr. Berl. 5: 19 (as *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 19.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 139—141, Fig. 61, 67, 74.
Ruthe, 1861, Berl. ent. Z. 5: 155 (*Blacus vagans*).

Rather variable species, in the Netherlands collected at Waarder (Zuid-Holland) only.

Blacus (Blacus) stelfoxi Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 144—145, Fig. 64, 66, 76.

I have seen 3 ♀ of this rare species which I collected at Waarder (Zuid-Holland). As most species mentioned in this paper from the Netherlands, this species is new to the Dutch fauna.

Blacus (Blacus) hostilis Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 143—144, Fig. 62, 75.

Only known from 3 ♀ in the Foerster collection, probably from the surroundings of Aachen.

Blacus (Blacus) modestus Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 132—133, Fig. 49, 54.

Through the kindness of Dr. Haeselbarth I could examine a paratype. The malar suture is absent and the length of the ovipositor sheath measures 0.35 times the length of the fore wing.

Blacus (Blacus) radialis Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 126, Fig .50.

Three specimens were examined from Nepal: "Nepal, 2 mls S.W. Ulleri, 6000—7000

ft, 18.v.1954, J. Quinlen" (BM); "East Nepal Exp., R. L. Coe, B.M. 1962-177", "Taplejung Distr. below Sangu, edge of small mixed wood, c. 6000 (ft), 4.xi.1961" (AC); first label identical, "Damp evergreen forest above Sangu, c. 9200 (ft), 2-26.xi.1961" (BM). Hind tarsus somewhat shorter than hind tibia.

Blacus (Blacus) forticornis Haeselbarth

Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 126—127, Fig. 48.

Very rarely collected, but it may occur in the Netherlands; see note under *caduceus*.

Blacus (Blacus) longipennis (Gravenhorst) (Fig. 386, 387)

Gravenhorst, 1809, Vergl. Ubers. Linn. zool. Syst.: 268 (as *Ophion*).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 22.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 130—132, Fig. 47, 52, 56.
Ruthe, 1861, Berl. ent. Z. 5: 156 (*Blacus dubius*).

Specimens examined from Waarder (Zuid-Holland), Vogelenzang (Noord-Holland) and Putten (Gelderland), all in the Netherlands.

Blacus (Blacus) inopinus spec. nov. (Fig. 433—439)

Holotype, ♀, length of body 2.1, length of fore wing 2.0 mm.

Head. — Antenna slender, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 3.8 and 3.3 times their width, respectively, length of penultimate segments ca. 1.7 times their width; dorsal length of eye 0.9 times temple; POL : Ø ocellus : OOL = 17 : 7 : 20; frontal and malar sutures absent; vertex, frons, clypeus and face smooth; area in front of occipital carina distinctly crenulate; length of malar space ca. 1.2 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulato-rugose, except for dorsal third; zone behind prepectal carina almost smooth; epicnemial suture finely striate; precoxal suture complete, finely punctato-striate; metapleural flange large; notauli deep and crenulate anteriorly, rather shallow and almost smooth posteriorly; mesoscutal lobes moderately convex, slender (Fig. 435); scutellar suture smooth, except for distinctly developed medial carina, deep; scutellum smooth, except for some rugae apically, its lateral carina rather weakly developed, indistinct laterally; propodeal tubercle absent; whole surface of propodeum transversely reticulato-rugose, posterior surface more reticulate.

Wings. — Parastigma small; r 2 straight; 1st discoidal cell sharp anteriorly; subdiscoideus almost straight basally; cu 3 (and 2) wanting; d 1 : d 2 = 1 : 6; metacarp surpassing radial cell (Fig. 439).

Legs. — Length of femur, tibia and basitarsus of hind leg 4.4, 10.0 and 8.0 times their width, respectively; hind coxa and femur smooth.

Metasoma. — Length of 1st tergite 1.7 times its apical width, spiracle distinctly protruding, surface (reticulato-)rugose, dorsal carinae distinct in basal two-fifths; length of ovipositor sheath 0.27 times fore wing, somewhat longer than hind femur.

Colour. — Reddish brown; palpi, antenna basally, mandible, labrum, pronotum, tegulae, pterostigma, metasoma antero-ventrally and legs, more or less yellowish; head (except mouth parts), antenna largely and apical half of metasoma, dark brown.

Holotype in Stam Collection, Den Haag: "No. v. 8360, Stam Coll.", "Zaïre, Lubumbashi (= Elizabethville), 10-11.ii.1972, A. B. Stam, at light".

Blacus (Blacus) chilensis spec. nov. (Fig. 440—446)

Holotype, ♀, length of body 2.9, length of fore wing 2.7 mm.

Head. — Antenna stout, length of 3rd segment 1.4 times 4th segment, length of 3rd and 4th segments 2.8 and 2.0 times their width, respectively, length of penultimate segments ca. 1.2 times their width; dorsal length of eye 0.9 times temple (Fig. 446); POL : Ø ocellus : OOL = 5 : 2 : 2; frontal and malar sutures absent; face smooth, except for some rugae near antennal sockets; clypeus smooth excpt for some weakly developed punctures, apical half flattened; vertex and frons smooth; area in front of occipital carina crenulate; length of malar space 1.6 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulato-rugose; zone behind prepectal carina almost smooth; epicnemial suture finely rugose; precoxal suture complete, finely reticulato-rugose, rather wide; mesoscutal lobes rather convex; notauli completely crenulate, rather narrow anteriorly, distinctly widening apicad (Fig. 443); scutellar suture moderately deep with one rather weakly developed medial carina; scutellum convex and smooth, its lateral carina absent; propodeal tubercle small but distinct; surface of propodeum rugoso-reticulate, almost smooth anteriorly.

Wings. — Parastigma small; r 2 almost straight; cu 3 (and 2) absent; metacarp not surpassing radial cell; d 1 : d 2 = 10 : 11; 1st discoidal cell sharp anteriorly.

Legs. — Length of femur, tibia and basitarsus of hind leg 5.0, 8.4 and 8.3 times their width, respectively; hind femur rather pimply, hind coxa rugose dorso-basally.

Metasoma. — Length of 1st tergite 1.4 times its apical width, rather weakly punctato-rugose, dorsal carinae distinct in basal half; length of ovipositor sheath 0.21 times fore wing.

Colour. — Brownish black; antenna, tegulae, mandible, clypeus largely, pterostigma and metasoma (except for 1st tergite), reddish brown; palpi and legs brownish yellow; antenna and metasoma darkened apicad.

Holotype ♀ in MCZ, Cambridge (USA): "Chile, 190., P' Herbst".

Note. Closely related to *exilis* and it may well have evolved from this widely spread Holarctic species in the W. Neotropical area. Distinguished from its relatives by its punctulate, apically flattened clypeus.

Neoblacus Ashmead, subgenus, stat. nov.
(Fig. 447—453)

Ashmead, 1900, Proc. U.S. natn. Mus. 23: 122.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 116.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 75, 134.

Type-species: *Neoblacus rufipes* Ashmead, 1900 (nec *Blacus rufipes* (Ashmead, (1888) 1889)).

Diagnosis. — Medium-sized; antennal segments of ♀ 17, of ♂ 18 (but apical segment may be partly divided); eye bare; occipital carina complete, distinctly developed; frons and vertex smooth; length of malar space ca. twice basal width of mandible; palpi medium-sized, length of maxillary palpus about equal to height of head; frontal and

malar sutures absent; face and clypeus smooth; apical margin of clypeus thin, slightly concave medially; precoxal suture complete, reticulato-rugose; pleural suture narrow, rather shallow and finely crenulate; metapleural flange medium-sized, blunt; notauli only in anterior half distinctly developed and crenulate, rather shallow (but sometimes almost complete); scutellar suture deep, wide with one distinctly developed carina; whole scutellum rugoso-reticulate, apically rounded and sloping towards metanotum, its lateral carina weakly developed, scarcely discernable from lateral rugosity; length of dorsal surface of propodeum about equal to length of posterior surface; propodeum superficially rugose dorsally and reticulate posteriorly, no medial area present; propodeal tubercle distinct, blunt and lowly attached (Fig. 447); cu 1, 2 and 3 absent, with sometimes a few remains near cuqu 1; parastigma small; r 2 slightly bent; subdiscoideus almost straight, slightly bent only (Fig. 450); hind coxa with some rugae and a carina dorsally; all claws simple; metacarp not or only slightly surpassing radial cell; length of hind femur 4.0 times its width; ovipositor slightly but evenly bent ventrad; length of ovipositor sheath 0.22—0.25 times fore wing; hypopygium medium-sized.

Distribution. — Holarctic: one species.

Notes. This subgenus is closely allied to subgenus *Blacus* and differs mainly by the absence of cu 1 (but some remnants may be present) and lowly attached propodeal tubercle (Fig. 447).

Important apomorphous characters are: 1 — margin of clypeus slightly concave medially; 2 — notauli reduced; 3 — scutellum rugoso-reticulate; 4 — medial area of propodeum absent; 5 — propodeal tubercle present, lowly attached; 6 — cu 1, 2 and 3 absent; 7 — ovipositor slightly bent ventrad, short.

For a very long time the interpretation of *Neoblacus* has been problematic because the type of the type-species was never properly described and is now lost. A repeated search by Dr. P. M. Marsh and Dr. W. R. M. Mason was only partly successful; the pin with the labels of Ashmead ("Mt. Wash'n", "*Neoblacus rufipes* Ashm, ♀") was found. Unfortunately the specimen itself is missing except for a front leg, which may well be identical with the front leg of *koenigi*. The situation is further complicated by the repeated convergent reduction of cu 1 in several groups, e.g. in the Blacini and in the Euphorinae. To clear the situation the figured specimen from Sudbury, Ontario (CNC) is herewith selected as neotype of *Neoblacus rufipes* (Ashmead, 1900) (nec Ashmead, 1889), which is conspecific with *koenigi* Fischer, 1966.

Blacus (Neoblacus) koenigi Fischer (Fig. 447—453)

Fischer, 1966, Z. angew. Ent. 58: 333—335, Fig. 13.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 133—134, Fig. 60.
Ashmead, 1900, Proc. U.S. natn. Mus 23: 122 (*Neoblacus rufipes*). Syn. nov. (nec *Blacus rufipes* (Ashmead, (1888) 1889), Proc. U.S. natn. Mus. 11: 626).

Neotype of *Neoblacus rufipes* herewith selected and described below.

Neotype, ♀, length of body 2.4, length of fore wing 1.8 mm.

Head. — Antennal segments 17 (also in 11 ♀ examined), length of 3rd segment 1.3 times 4th segment; length of 3rd and 4th segments 4.3 and 3.3 times their width, respectively, length of penultimate segments 1.8—2.0 times their width; dorsal length of eye equal to temple (Fig. 448); POL : Ø ocellus : OOL = 6 : 2 : 5; area in front of occipital carina finely crenulate; mandible somewhat twisted medially.

Mesosoma. — Length of mesosoma 1.4 times its height; side of pronotum reticulato-rugose, except for dorsal patch (Fig. 447); side of middle lobe of mesoscutum rugoso-reticulate; zone behind prepectal carina almost smooth; finely crenulate; epicnemial suture smooth; metapleura rugoso-reticulate; mesoscutal lobes flattened dorsad.

Wings. — Nervulus indistinct, short; nervellus medium-sized, after middle of mediella; d 1 : d 2 = 1 : 4.

Legs. — Length of femur, tibia and basitarsus of hind leg 4.0, 9.5 and 9.5 times their width, respectively.

Metasoma. — Length of 1st tergite 1.8 times its apical width (as in examined paratype of *koenigi*), surface finely rugoso-reticulate (in other specimens basally often superficial and shiny), dorsal carinae rather weakly developed, distinct in basal half (Fig. 453); 2nd tergite finely rugose medio-basally, remainder of metasoma smooth, except for some superficial punctures on apices of 3rd to 5th tergites; length of ovipositor sheath 0.25 times fore wing.

Colour. — Reddish brown; palpi, mandible, base of antenna, tegulae, legs, metasoma antero-ventrally and 3rd and 4th metasomal tergites partly, yellowish; pterostigma brown; hind femur and tibia in other specimens often somewhat brownish yellow.

Neotype ♀ (of *rufipes*) in CNC, Ottawa: "Sudbury Ont. 1890", "109".

Other specimens examined: "e.l. 11.5.1965, Bez. Baden, N.O. leg. C. Holzschuh", "ex *Acer platanoides* L.", "bei *Scolytus königi* Sa.". Legs of this paratype (of *B. koenigi*) brownish, length of ovipositor sheath 0.22 times fore wing.

Additional specimens were examined from Maryland (Beltsville (in mushroom houses, 2 ♂, identified by Muesebeck as *Neoblacus rufipes* Ashm.) and Plummers (ex (the fungus) *Stemonitis fusca*)); California (Humboldt Co., ex cones of *Pseudotsuga menziesii*); Massachusetts (Mt. Toby); New Hampshire (Durhan); Quebec (La Trappe); Wisconsin (16 ♀ and 29 ♂ : Wood Co., Nekoosa, R. D. Shenefelt, Bd. (?), frequently collected with light trap by W. W. Barrett); mainly collected in August and first half of October, less frequently towards the end of July (SC, AC, HC, USNM).

Apoblacus gen. nov.
(Fig. 469—476)

Etymology: the prefix "apo" (Greek for separated, or derived from) is added to *Blacus*, because it is a derived group, related to *Blacus*. Gender, masculine.

Type-species: *Apoblacus centistoides* spec. nov.

Diagnosis. — Dorsal aspect of head quadrate (Fig. 471); antenna comparatively wide (Fig. 469); eye small, bare; occipital carina and epistomal suture complete; frons and vertex smooth; frontal and malar sutures absent; palpi short, stout; occipital flange distinct; precoxal and epicnemial sutures completely sculptured; pleural suture rather wide; metapleural flange large and blunt; notauli absent, except for some remnants posteriorly; lateral carina of scutellum absent but some lateral striae present; dorsal surface of propodeum longer than its posterior surface, without distinctly developed carinae (Fig. 476); propodeal tubercles present; metacarp ending near apex of the radial cell (Fig. 475); 1st brachial cell open apically and posteriorly (at least in its apical half); nervellus indistinct, short; submedial cell strongly widened apicad; aqu 1 + 2 and aqu′ absent; fore and middle claws of ♀ with medium-sized, dark brown bristles (Fig. 473), hind claw simple; length of hind femur 3.5 times its width; length of 1st metasomal

tergite 1.7 times its apical width; glymma wide; laterope rather shallow; dorsope medium-sized; 2nd tergite smooth; 2nd-5th tergites completely enclosing metasoma, its sternites invisible and ventral side of metasoma equally sclerotized as its dorsal side; ovipositor straight, rather wide basally (Fig. 469), length of its sheath 0.07 times fore wing; hypopygium invisible.

Distribution. — Neotropical : one species.

Apoblacus centistoides spec. nov. (Fig. 469—476)

Holotype, ♀, length of body 1.9, length of fore wing 1.8 mm.

Head. — Antennal segments incomplete, 12 segments present, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 1.7 and 1.3 times their width, respectively; maxillary palpus distinctly shorter than height of head; dorsal length of eye 0.5 times temple (Fig. 471); temple and vertex smooth; POL : Ø ocellus : OOL = 12 : 5 : 13; frons almost flat; occipital carina distinctly developed, area in front of it crenulate; face and clypeus smooth; anterior tentorial pits small and deep (Fig. 470); apical margin of clypeus straight, thin; length of malar space about 1.7 times the basal width of mandible.

Mesosoma. — Length of mesosoma 1.6 times its height; side of pronotum completely rugoso-punctate; zone behind prepectal carina crenulate; epicnemial and precoxal sutures completely transversely striate (Fig. 469); pleural suture distinctly crenulate; episternal scrobe large; metapleura punctato-rugose; mesoscutum convex, smooth, without notauli but with some remnants in front of the scutellar suture (Fig. 474); scutellar suture deep, with five distinctly developed longitudinal carinae; scutellum almost smooth, moderately convex; propodeal tubercle rather small, but distinctly developed; dorsal surafce of propodeum coarsely rugoso-punctate, almost smooth anteriorly, its posterior surface coarsely transversely punctato-rugose.

Wings. — First discoidal cell shortly petiolate; r 2 straight; d 1 : d 2 = 10 : 14; parastigma small, indistinct; wings comparatively narrow (Fig. 475); sm 2 almost completely absent.

Legs. — Hind coxa generally rugose; femur and tibia of hind leg smooth; tarsal claws slender; length of femur, tibia and basitarsus of hind leg 3.5, 8.0 and 7.0 times its width, respectively.

Metasoma. — Length of 1st tergite 1.7 times its apical width, its surface superficially and longitudinally striate (Fig. 476), spiracles not protruding, its dorsal carinae distinct in basal third; length of ovipositor sheath 0.07 times fore wing; setae of 2nd and following tergites in dorsal rows.

Colour. — Brownish black; legs and mandibles, dark reddish brown; palpi, tegulae and pterostigma, brown; wings infuscated; r 2 and cu 3 discoloured.

Holotype ♀ in CNC, Ottawa: "Chile, 12.x.1951, L. E. Peña, Linares", "Rio Ancoa", "Blacini, new genus, det. W. R. M. Mason 73".

Notes. I have examined an additional male of a related species from Chile ("Rio Gol-Gol, Osorno, 8-11.ii.1951, L. E. Peña", CNC) with mesoscutum reddish, basal half of sm 2 present; r 2 coloured; 1st discoidal cell truncate; propodeum with weak longitudinal carina; clypeus striate; legs and 1st tergite more slender and posterior half of scutellum coarsely punctate.

This is the group with the largest number of apomorphous characters included in the

Blacini. The apomorphous characters important in the Blacini are : 1 — sm 2 absent, at least apically; 2 — aqu 1 + 2 absent; 3 — sm strongly widened apically; 4 — wings relatively narrow; 5 — at least basal 0.8 of notauli completely absent; 6 — dorsal surface of propodeum much longer than its posterior surface and without transverse carinae; 7 — propodeal tubercles present; 8 — 2nd-5th tergites enclose metasoma completely; 9 — ovipositor very short and comparatively wide basally; 10 — eyes small; 11 — metacarp ends near apex of radial cell; 12 — palpi short; 13 — 2nd metasomal tergite smooth; 14 — fore and middle claws with brownish bristles; 15 — antenna stout; 16 — r 1 leaves pterostigma near its distal third; 17 — malar suture absent.

The plesiomorphous characters are : 1 — occipital carina and precoxal suture complete; 2 — metapleural flange large; 3 — lateral carina of scutellum indistinct; 4 — scutellar suture with carinae; 5 — dorsal aspect of head quadrate.

Artocrus gen. nov.
(Fig. 292—299)

Etymology: from "artus" (Latin for narrow) and "crus" (Latin for leg) because of its slender legs. Gender, neuter.

Type-species: *Artocrus spinarius* spec. nov.

Diagnosis. — Number of antennal segments rather large; palpi slender, long; eye bare (except for some short setae); occipital carina complete, distinctly developed; frons and vertex smooth; malar suture absent; face smooth; clypeus wide, smooth, its margin straight medially, its edge somewhat thickened and upcurved; precoxal suture distinct, crenulate as pleural suture; metapleural flange large; notauli complete; scutellar suture deep, with one longitudinal carina; scutellum smooth, with large spine apically (Fig. 293), spine concave apico-anteriorly (Fig. 298), its lateral carina present in basal half only; 1st discoidal cell petiolate; parastigma medium-sized (Fig. 295); length of hind femur 8.0 times its width; hind tibia constricted basad (Fig. 297); fore and middle claws of ♀ with large, subbasal bristles and a lamelliform tooth basally (Fig. 296); hind claw simple, medium-sized; propodeum with medial and both lateral carinae (Fig. 292), but no distinct posterior areas; dorsal surface of propodeum distinctly longer than posterior surface (Fig. 293); propodeal tubercle absent; 1st metasomal tergite slender, convex, dorsope large (Fig. 292); 2nd tergite smooth; ovipositor straight; hypopygium rather large (Fig. 293).

Distribution. — Neotropical: one species.

Notes. Important apomorphous characters are: 1 — large apical spine of scutellum; 2 — lateral carina of scutellum present in anterior half; 3 — hind tibia strongly constricted basally; 4 — fore and middle claws of ♀ with blackish bristles and teeth; 5 — transverse carinae of propodeum absent; 6 — dorsal surface of propodeum longer than its posterior surface; 7 — 2nd tergite smooth; 8 — hypopygium rather large; 9 — ovipositor short.

Artocrus spinarius spec. nov. (Fig. 292—299)

Holotype, ♀, length of body 3.9, length of fore wing 3.8 mm.

Head. — Antennal segments 27, length of 3rd segment 1.3 times 4th segment, length of 3rd and 4th segments 7.2 and 5.4 times their width, respectively, penultimate seg-

ments somewhat longer than their width (Fig. 293); length of maxillary palpus ca. 1.5 times height of head; dorsal length of eye 1.1 times length of temple (Fig. 294); frontal suture short (Fig. 299); POL : Ø ocellus : OOL = 11 : 7 : 16; frons rather flat; area in front of occipital carina crenulate; face slightly convex, with small tubercle medially (Fig. 299); length of malar space about equal to twice basal width of mandible; malar suture absent, but with a shallow depression near eye (Fig. 299).

Mesosoma. — Whole mesosoma setose except for surroundings of speculum; length of mesosoma 1.4 times its height (without spine: 1.5 times); side of pronotum nearly smooth except for some rugae (Fig. 293); zone behind prepectal carina almost smooth; epicnemial suture smooth; precoxal suture deeply impressed, absent anteriorly, crenulae widely spaced (Fig. 293); episternal scrobe small; notauli deep and distinctly crenulate; mesoscutal lobes distinctly convex, smooth; scutellum rather convex; side of scutellum smooth, except for some indistinct carinae; propodeum smooth, except for distinct medial and both lateral carinae and some superficial rugosity (Fig. 292).

Wings. — r 2 straight; d 1 : d 2 = 9 : 27; infuscate except for hyaline area near and below parastigma.

Legs. — Hind leg almost smooth; length of femur, tibia and basitarsus of hind leg 8.0, 10.2 and 11.7 times their width, respectively.

Metasoma. — Length of 1st tergite 2.2 times its apical width, convex anteriorly, shiny, smooth except for some superficial rugosity, dorsal carinae confluent, distinct in basal third, spiracle distinctly protruding (Fig. 292); length of ovipositor sheath 0.18 times fore wing.

Colour. — Dark brown; tarsi, trochanters, pedicellus and annellus partially, parastigma, mandible and basal sternites of metasoma, more yellowish brown.

Holotype ♀ in CNC, Ottawa: "Nova Teutonia, 27°11'S, 52°23'W, Brazil, 300-500 m, 3.ix.1948, Fritz Plaumann". Paratypes: All topotypic, 75 ♀, antennal segments 27 (60 specimens), 26 (5), one specimen has left 26 and right 27, another left 27 and right 28. Most specimens captured in second half of May and first half of June (BM, AC, HC, CNC). Further 12 ♂, antennal segments 28 (6) or 27 (5). Mostly captured in 1st half of May (BM, AC).

EXCLUDED SPECIES
(types examined)

cremastobombyciae Fullaway, 1956, = *Mirax cremastobombyciae* (Fullaway, 1956) comb. nov. (Microgasterinae, Miracini) (Fig. 454—460)

Fullaway, 1956, Proc. Hawaiian Ent. Soc. 16 (1): 40.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.

Holotype, ♀, length of body 1.9, length of fore wing 1.8 mm.

Head. — Antennal segments 14, length of 3rd segment 1.2 times 4th segment, length of 3rd and 4th segments 5.3 and 4.3 times their width, respectively, length of penultimate segments 2.7—2.9 times their width; length of palpi ca. 0.7 times height of head; eye bare; dorsal length of eye 1.8 times temple; temple with fine micro-sculpture, shallowly rugose behind; POL : Ø ocellus : OOL = 5 : 3 : 7; frontal suture absent; frons and vertex finely coriaceous; vertex concave posteriorly (Fig. 459); occipital carina absent but replaced laterally by incomplete rugae, area in front of them rugose; face

finely coriaceous, dull, slightly convex; tentorial antennal pits small and rather shallow; clypeus moderately convex, its apical margin shiny, almost straight, truncate and somewhat convex (Fig. 458); malar flange indistinct; malar suture distinct; length of malar space somewhat less than basal width of mandible.

Mesosoma. — Length of mesosoma 1.3 times its height; side of pronotum smooth except for fine micro-sculpture; side of middle lobe of mesoscutum superficially rugose; pronotum dorsally almost smooth, collar-shaped; prepectal carina absent; epicnemial suture smooth, except for micro-sculpture; precoxal suture shallow, narrow, smooth; episternal scrobe absent; metapleural flange absent but with ring-shaped elevation (Fig. 454); metapleura smooth; notauli present in basal half only, widely crenulate (Fig. 460), completely absent posteriorly; mesoscutal lobes flattened, especially posteriorly, finely coriaceous; scutellar suture wide, deep, with four distinct carinae; scutellum finely coriaceous, slightly convex, its lateral carina absent; side of scutellum almost smooth; propodeal tubercle absent; dorsal surface of propodeum transversely carinate (Fig. 456), posterior surface not separated from dorsal surface, sloping, medial and both lateral carinae lamelliform (Fig. 456); propodeal spiracle small, almost flat.

Wings. — Parastigma rather large, metacarp largely reduced (Fig. 455); 1st discoidal cell sharp anteriorly; r 2 effaced, except for basal part, equal to cu 2, together with cuqu 1 from pterostigma; nervulus rather long, inclivous; nervellus medium-sized, reclivous, vannal lobe present, intercubitella and interradiella absent; greatest width of hind wing submedially (Fig. 455).

Legs. — Length of femur, tibia and basitarsus of hind leg 3.2, 9.4 and 5.0 times their width, respectively; hind coxa and femur almost smooth; all claws simple, small.

Metasoma. — Length of 1st tergite ca. 7.4 times its apical width and ca. 4.1 its maximum width, completely flat, medio-apically somewhat depressed, spiracle laterally in weakly sclerotized pleuron, flat, dorsal carinae absent, surface smooth, laterope and dorsope absent; 2nd tergite with T-shaped, sclerotized area, its lateral parts membranous, with irregular surface through drying, otherwise metasoma smooth; ovipositor straight; ovipositor sheath wide basally (Fig. 454), its length 0.14 times fore wing; hypopygium medium-sized, blunt apically.

Colour. — Brownish yellow; metasoma apically, pterostigma, costa, metacarp and stemmaticum, more or less brown.

Holotype ♀ in BPBM, Honolulu: "Honolulu, Oahu, 1955", "*Cremastobombycia lantanella*", "Holotype", "Type *Blacus cremastobombyciae*", "*Blacus cremastobombyciae* m. Det. D. T. Fullaway". No. of box: 5564.

Notes. Bred from *Cremastobombycia lantanella* Busck (Lepidoptera, Tineidae).

The lateral position of the spiracles of the 1st metasomal tergite, the shape of 1st and 2nd tergites, the position and reduction of the radius, the vannal lobe and the 14-segmented antenna indicate that this species belongs to the Microgasterinae, tribe Miracini, and is (without doubt) congeneric with *Mirax* Haliday, 1833.

longicaudus Provancher, 1886, = *Eubazus* (*Calyptus*) *longicaudus* (Provancher, 1886) nec Ratzeburg, 1844, comb. nov.; = *E.* (*C.*) *provancheri* nom. nov.

Provancher, 1886, Addit. Corr. Fauna Ent. Canada Hym.: 133, Fig.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 22.

Closely related to the Palaearctic *flavipes* (Haliday); figures and redescription of holotype will be published elsewhere.

natalensis Brues, 1926, = *Eubazus* (*Calyptus*) *natalensis* (Brues, 1926) comb. nov.

Brues, 1926, Proc. Am. Acad. Arts Sci. 6 (8): 277.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23.

See note under *longicaudus*.

pulcher Szépligeti, 1905, = *Orgilus pulcher* (Szépligeti, 1905) comb. nov.

Szépligeti, 1905, Annls. hist.-nat. Mus. natn. Hung. 3: 53.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23.

Hereby referred to the Orgilinae; the illustrated redescription of the holotype will be published elsewhere.

rubriceps Ashmead, 1894, transferred to Orgilinae.

Ashmead, 1894, J. Linn. Soc. 25: 131.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 23.

Belongs to a probably new genus near *Charmon* Haliday, 1833 (= *Cyclocormus* Cameron, 1911, syn. nov.), which will be treated in the near future.

SPECIES INQUIRENDAE (types not available)

Blacus barynoti (Boudier)

Boudier, 1834, Annls. Soc. ent. Fr. 3: 333, Fig. (in *Bracon*).
Shenefelt, 1969, Hym. Cat. (nov. ed) 4 (1): 17 (as syn. of *pallipes* Haliday).
Haeselbarth, 1971, Opuscula zool., München 112: 1—2.

The type is a ♂, probably of *Pygostolus sticticus* (F.).

Blacus brachialis Rondani

Rondani, 1877, Boll. Soc. ent. ital. 9: 167.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 79.

Blacus cerealis Curtis

Curtis, 1860, Farm Insects: 294.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21 (as syn. of *humilis* (Nees)).
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 79.

Possibly a synonym of *ambulans* Haliday, 1835; ♂ holotype in Curtis Collection at Melbourne.

Blacus chinensis Watanabe

Watanabe, 1950, Mushi 21: 25.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 18.

Blacus florus Goureau

Goureau, 1851, Annls. Soc. ent. Fr. (2) 9: 135—137, Fig. (II) 5—7.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 20.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 79.

Probably a junior synonym of *Blacus* (*Ganychorus*) *pallipes* Haliday.

Blacus fuscipes Goureau

Goureau, (1861) 1862, Bull. Soc. Sci. hist. nat. Yonne 15: 111—112.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 20.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 79.

It might be possible to identify this species by rearing the parasites of the host *Scolytus rugulosus* Ratz. Judging from the short description, it may belong to *Eubazus* Nees, subgenus *Brachistes*.

Blacus humillimus Dalla Torre (= *humilis* Spinola, 1851, nec Nees, 1812)

Spinola, 1851, in: Gay, Hist. fisica Polit. Chile 6: 532.
Dalla Torre, 1898, Cat. Hym. 4: 93.
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 21.

Unfortunately there is no specimen under *humilis* in the Spinola Collection at Torino, which fits the original description. The closed brachial cell and subsessile metasoma, oval, as stated in the description, make it almost certain that the type is a ♂ of *Eubazus* Nees (subgenus *Brachistes*).

Blacus wesmaeli Ruthe

Ruthe, 1861, Berl. ent. Z. 5: 147 (as *humilis* sensu Wesmael, p.p.).
Shenefelt, 1969, Hym. Cat. (nov. ed.) 4 (1): 26.
Haeselbarth, 1973a, Veröff. zool. St.-Samml., Münch. 16: 79.

Acknowledgements

To the following persons I am much indebted for the loan of types or gifts of unidentified specimens. The abbreviations used for the collections are given in brackets. Mr. J. J. de Boer, Pijnacker; Dr. J. G. Betrem, Deventer; Dr. J. Decelle, Musée Royal de l'Afrique Centrale, Tervuren (MAC); Mr. P. A. Clancey, Durban Museum and Art Gallery, Durban; Dr. Th. van Dijk, Wijster; Mr. A. van Frankenhuyzen, Wageningen; Dr. M. Fischer, Naturhistorisches Museum, Zool. Abt., Wien (NMW); Dr. E. Haeselbarth, Institut für angewandte Zoologie, München (HC); Mr. K-J. Hedqvist, Swedish Museum of Natural History, Stockholm; Mrs. C. N. Higa, Bernice P. Bishop Museum, Dep. of Entomology, Honolulu, Hawaii (BPBM); Mr. T. Huddleston, British Museum (Nat. Hist.), London (BM); Mr. K. J. Huisman, Melissant; Dr. H. Jahnke, Geologisch-Paläontologisches Institut und Museum der Georg-August-Universität, Göttingen; Dr. P. Kanaar, Leiderdorp; Mrs. S. Kelner-Pillault, Muséum National d'Histoire Naturelle, Entomologie, Paris (MNHN); Dr. R. König, Zoologisches Institut der Universität, Kiel; Mr. D. van der Laan, Oostvoorne; Mr. B. J. Lempke, Amsterdam; Dr. P. Marsh, Systematic Entomology Laboratory, USDA, c/o U.S. National Museum, Washington (USNM); Dr. W. R. M. Mason, Biosystematics Research Institute, Agriculture Canada,

Research Branch, Ottawa (CNC); Dr. S. J. van Ooststroom, Oegstgeest; Dr. C. E. O'Riordan, National Museum of Ireland, Dublin; Dr. J. Papp, Zoological Department of Hungarian Natural History Museum, Budapest (TMA); Dr. P. Passerin d'Entrèves, Museo ed Istituto di Zoologia sistematica, Torino; Dr. J-M. Perron, Université Laval, Quebec (PC); Mr. J. A. van Reenen, Transvaal Museum, Pretoria; Mr. G. van Rossem, Ede; Mrs. J. C. Scott, Museum of Comparative Zoology, Cambridge, Mass. (MCZ); Prof. Dr. R. D. Shenefelt, University of Wisconsin, Dep. of Entomology, Madison (SC); Dr. A. B. Stam, 's-Gravenhage; Prof. Dr. J. van der Vecht, Putten; Drs. A. P. M. van der Zon, Leiden; Drs. C. J. Zwakhals, Arkel; Drs. K. W. R. Zwart, Laboratorium voor Entomologie, Wageningen; author's collection (AC).

I wish to thank Dr. E. Haeselbarth for his invaluable help.

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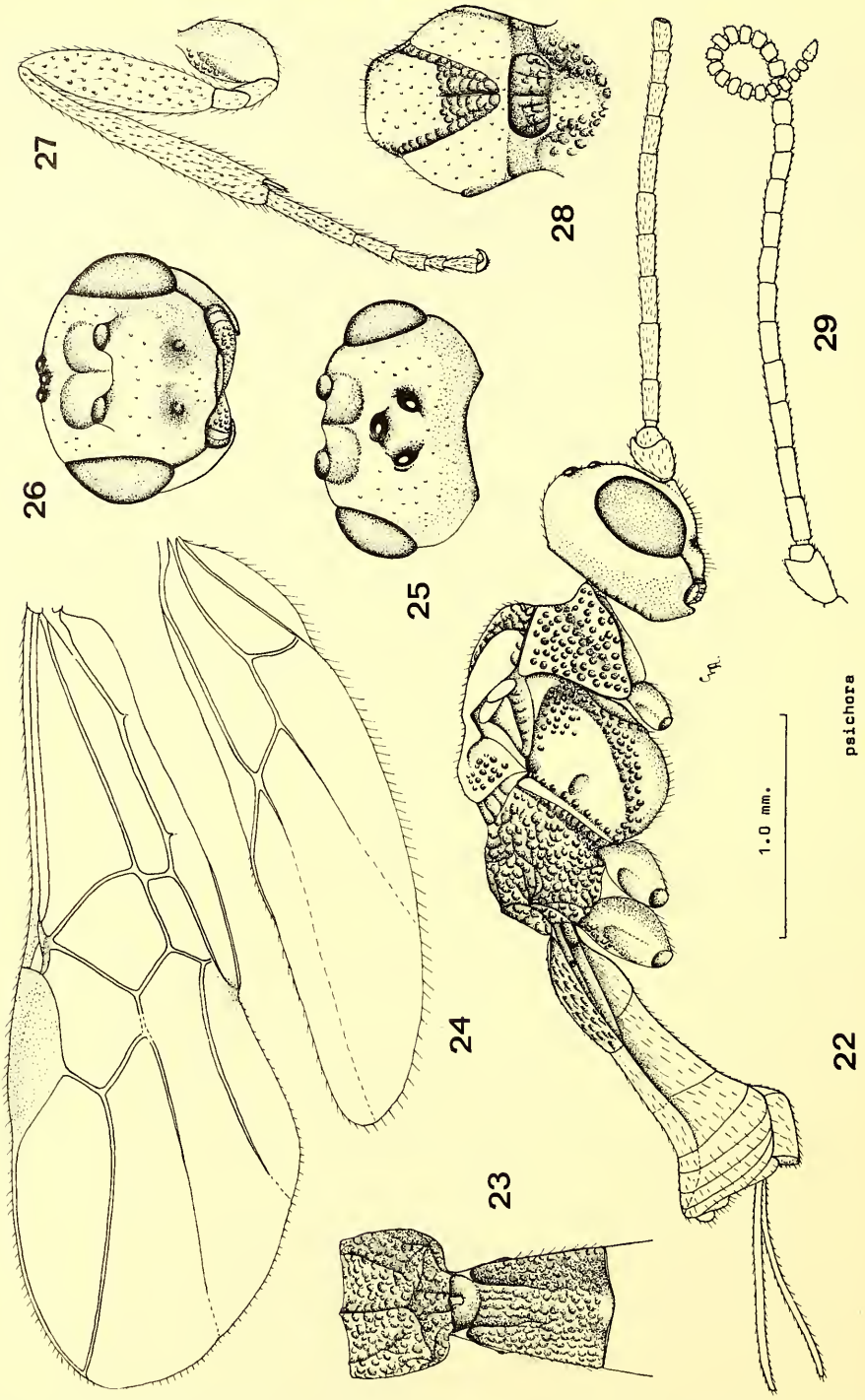

Fig. 22—29, *Blacozona psichora* spec. nov.; 22—25, 28, holotype; 26, 27, 29, paratype. 22, habitus, lateral aspect; 23, propodeum and 1st tergite, dorsal aspect; 24, wings; 25, head, dorsal aspect; 26, head, frontal aspect; 27, hind leg, lateral aspect; 28, mesonotum, dorsal aspect; 29, antenna, lateral aspect. 22, 24, 27, 29: scale-line; 23, 25, 26, 28: 1.2 × scale-line

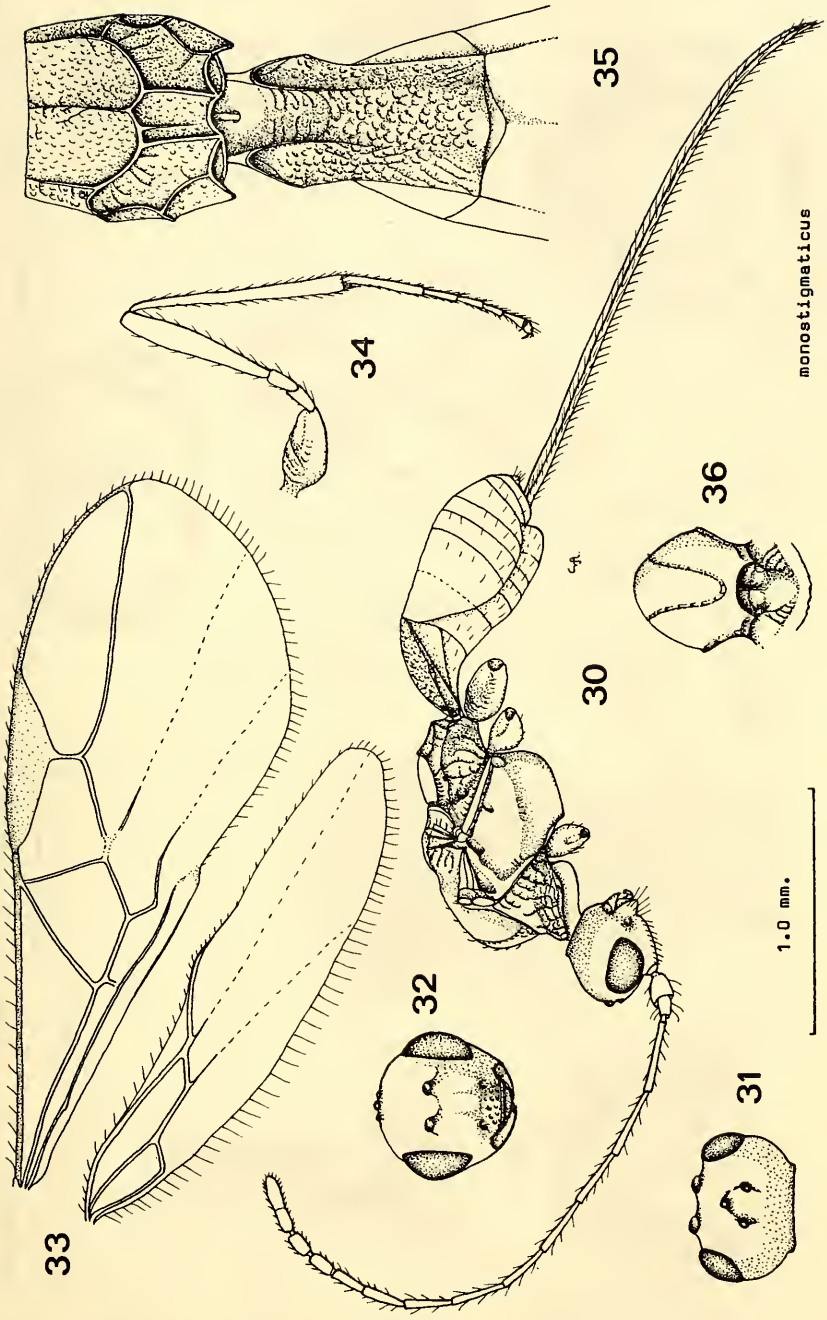

Fig. 30—36, *Blacus* (*Mesoxiphium*) *monostigmaticus* spec. nov., holotype. 30, habitus, lateral aspect; 31, head, dorsal aspect; 32, head, frontal aspect; 33, wings; 34, hind leg, lateral aspect; 35, propodeum and 1st tergite, dorsal aspect; 36, mesontoum, dorsal aspect. 30, 33, 34: scale-line; 31, 32, 36: 1.2 × scale-line; 35: 2.5 × scale-line

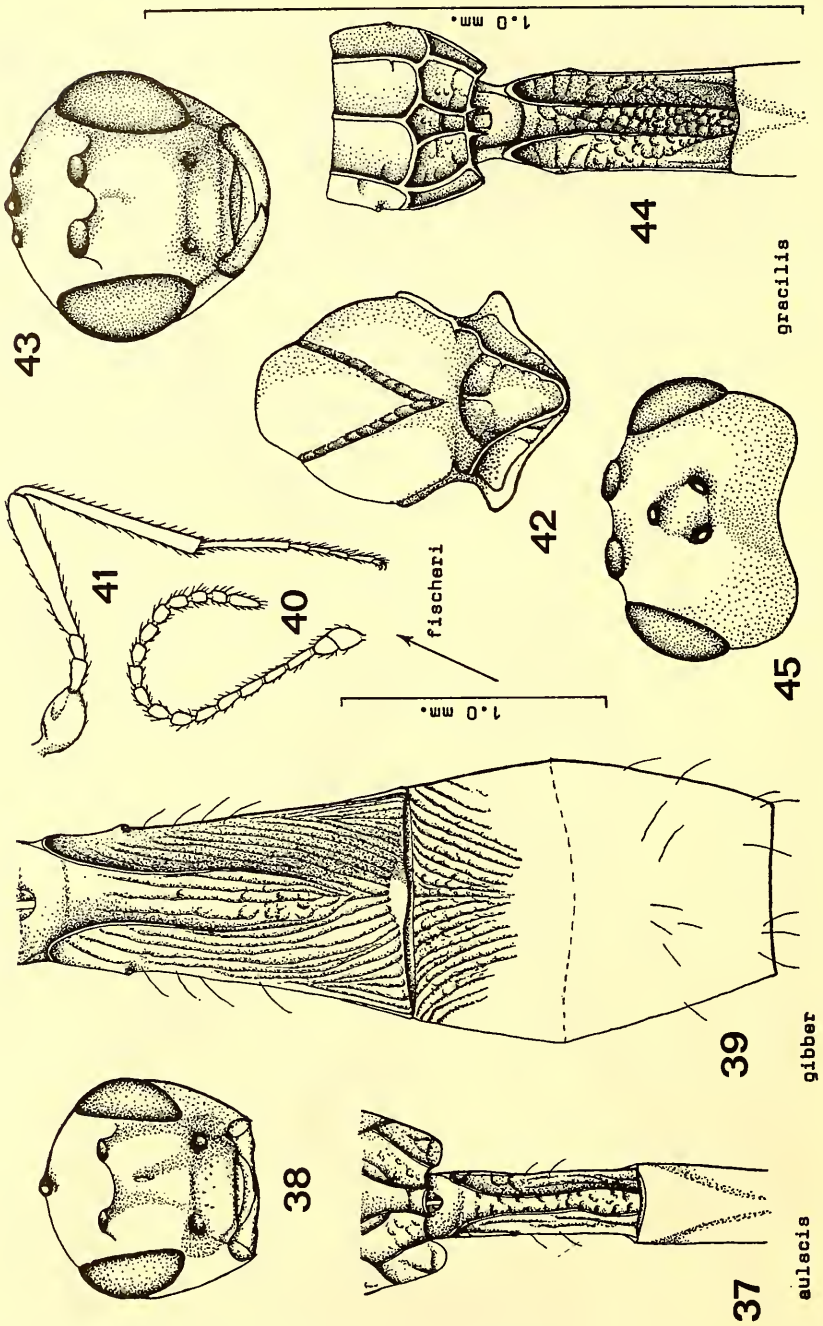

Fig. 37—45; 37, 38, *Blacus* (*Leioblacus*) *aulacis* spec. nov., holotype. 37, propodeum and 1st tergite, dorsal aspect; 38, head, frontal aspect. 39, *Blacus* (*Tarpheion*) *gibber* Haeselbarth, paratype, 1st-3rd tergites, dorsal aspect. 40, 41, *Blacus* (*Leioblacus*) *fischeri* Haeselbarth, holotype; 40, antenna, lateral aspect; 41, hind leg, lateral aspect. 42—45, *Blacus* (*Ischnotron*) *gracilis* Haeselbarth, paratype; 42, mesonotum, dorsal aspect; 43, head, frontal aspect; 44, propodeum and 1st tergite, dorsal aspect; 45, head, dorsal aspect. 38, 39, 42—45: long scale-line; 40,41: short scale line

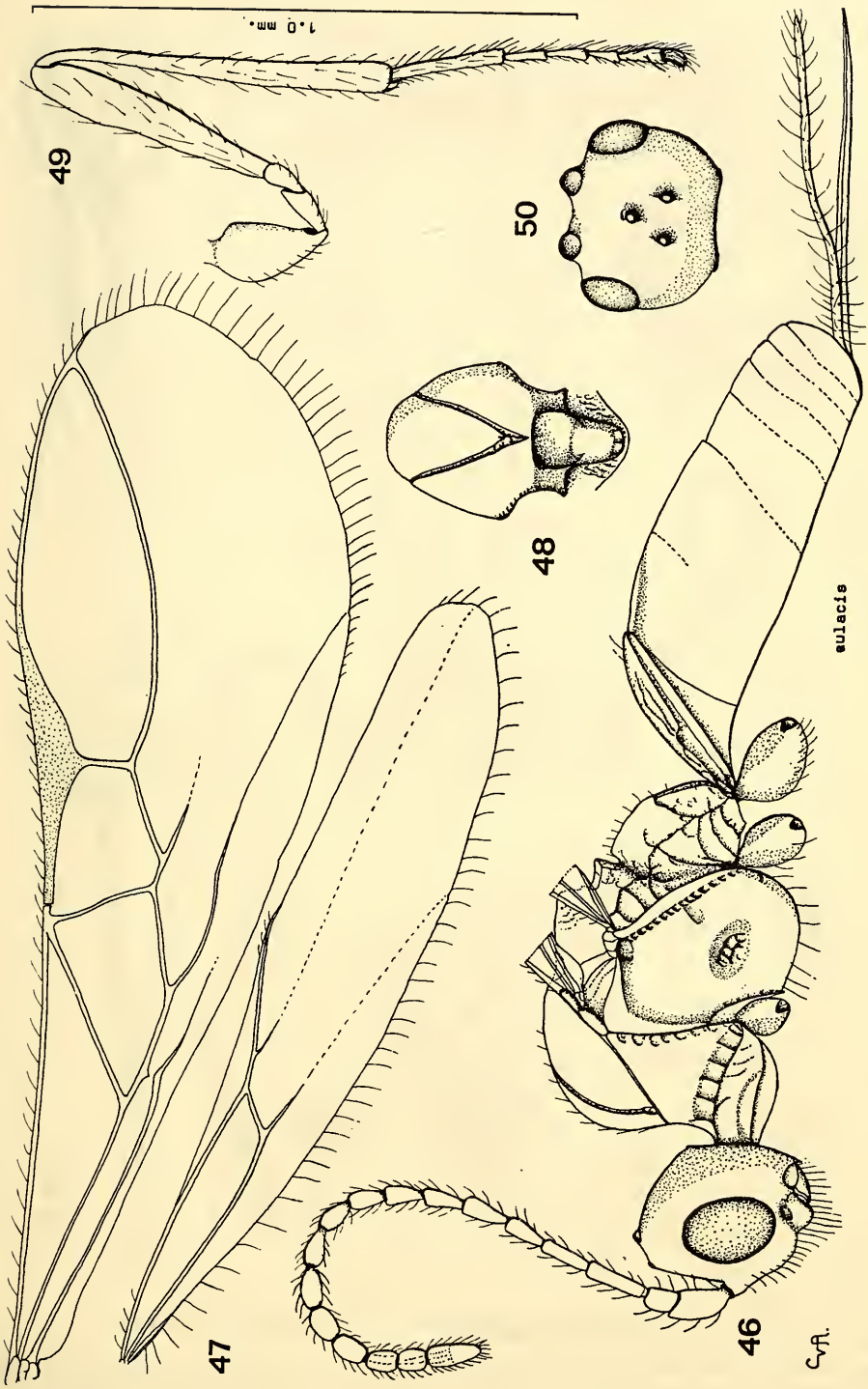

Fig. 46—50, *Blacus* (*Leioblacus*) *aulacis* spec. nov., holotype. 46, habitus, lateral aspect; 47, wings; 48, mesonotum, dorsal aspect; 49, hind leg, lateral aspect; 50, head, dorsal aspect

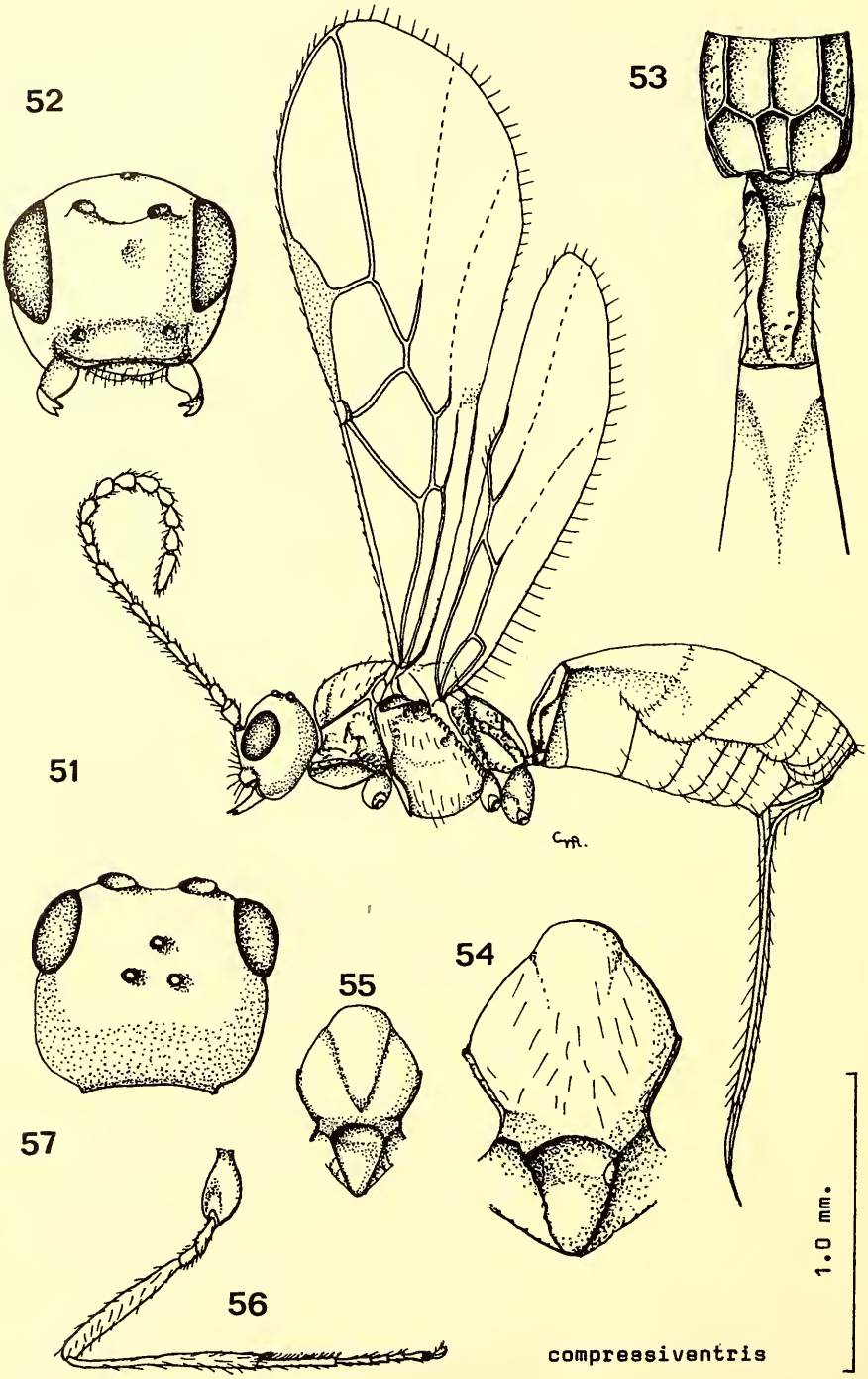

Fig. 51—57; 51—54, 56, 57, *Blacus* (*Leioblacus*) *compressiventris* spec. nov., holotype; 55, *Blacus* (*L.*) *fischeri* Haeselbarth, holotype. 51, habitus, lateral aspect; 52, head, frontal aspect; 53, propodeum, 1st and 2nd tergites, dorsal aspect; 54, 55, mesonotum, dorsal aspect; 56, hind leg, lateral aspect; 57, head, dorsal aspect. 51, 56: scale-line; 52, 53, 54, 57: 2.5 × scale-line; 55: 1.2 × scale-line

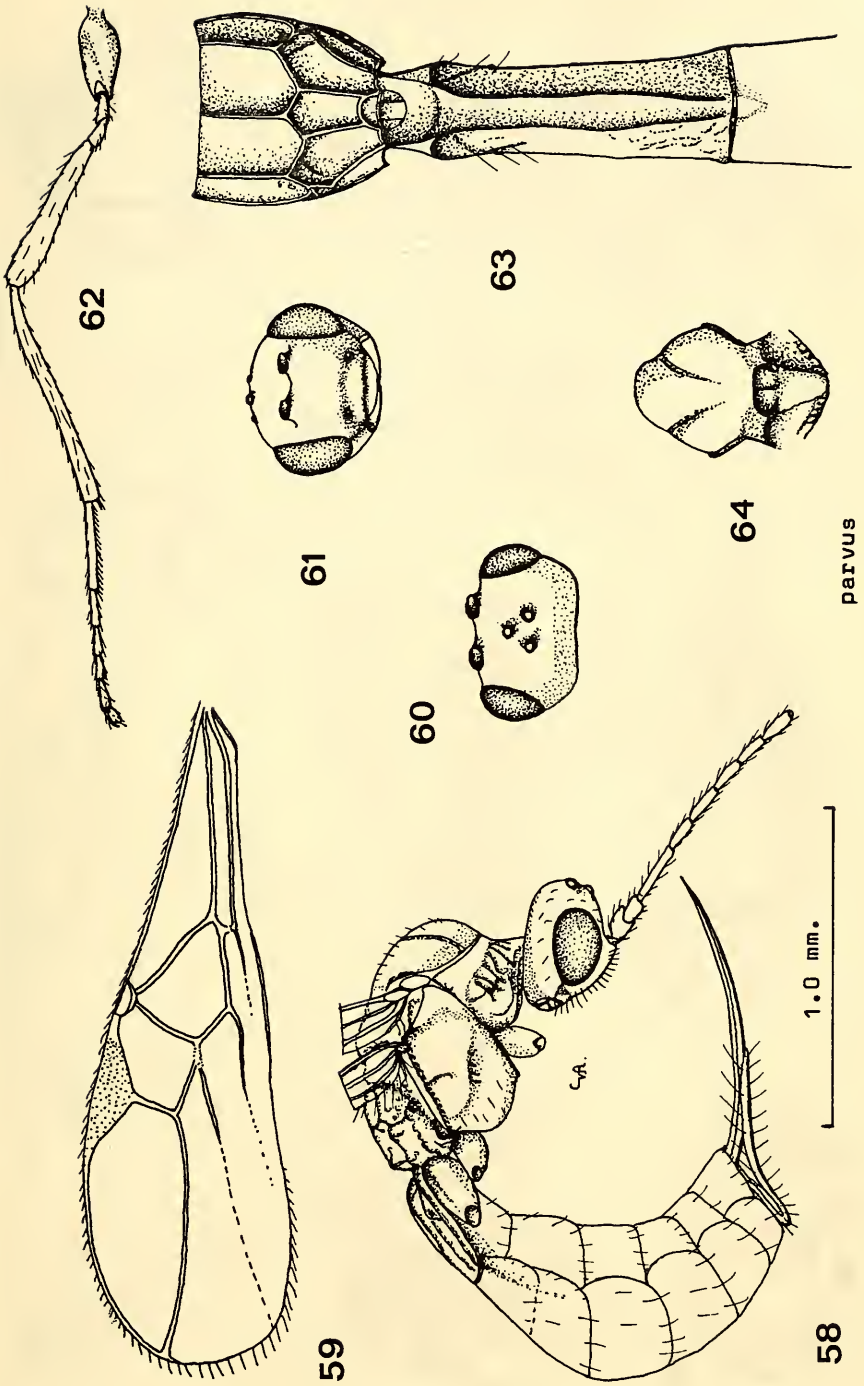

Fig. 58—64, *Blacus* (*Ischnotron*) *parvus* Haeselbarth, Elisabethville (Zaïre). 58, habitus, lateral aspect; 59, fore wing; 60, head, dorsal aspect; 61, head, frontal aspect; 62, hind leg, lateral aspect; 63, propodeum and 1st tergite, dorsal aspect; 64, mesonotum, dorsal aspect. 58, 59, 62: scale-line; 60, 61, 64: 1.2 × scale-line; 63: 2.5 × scale-line

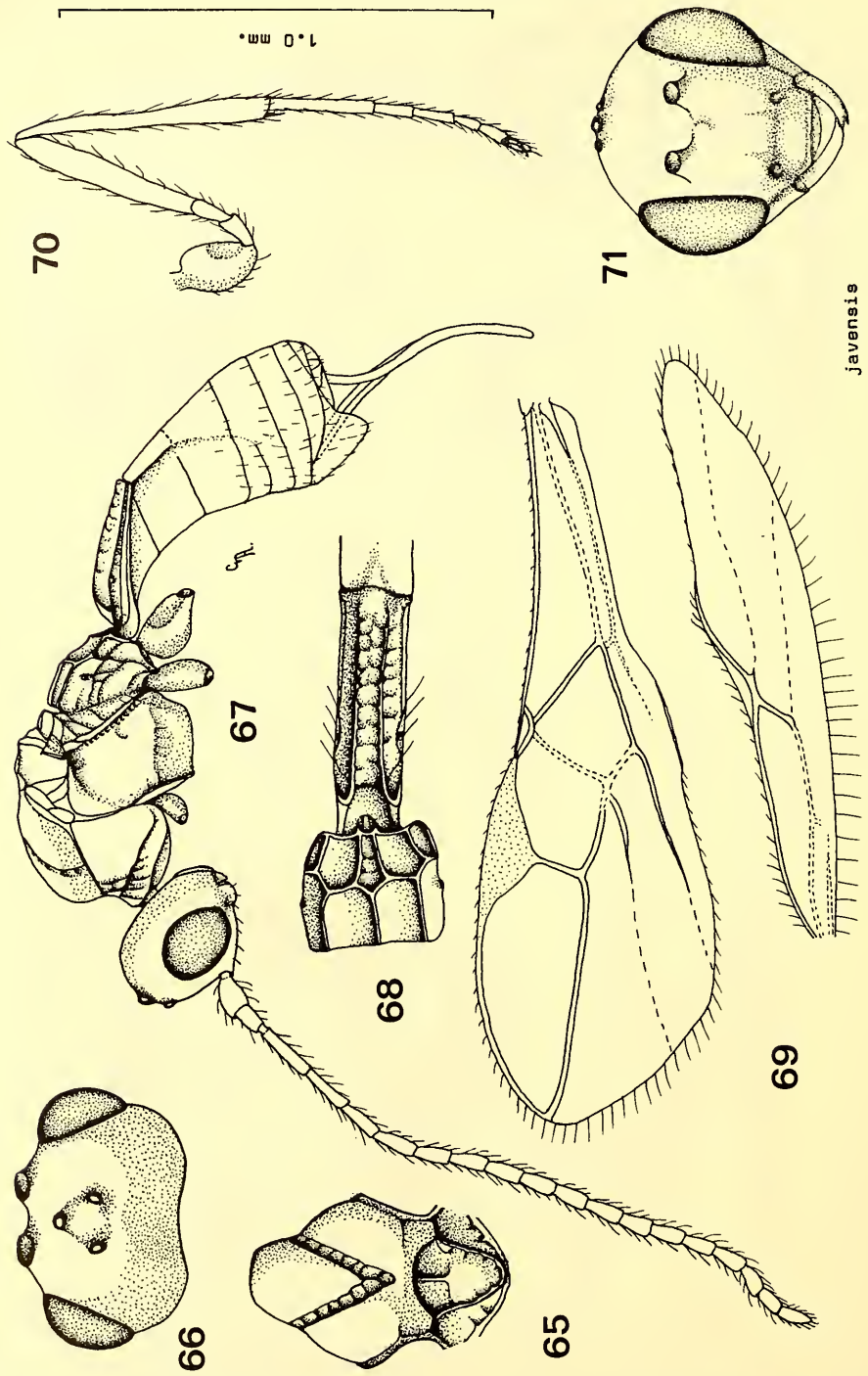

Fig. 65—71, *Blacus* (*Ischnotron*) *javensis* spec. nov., holotype. 65, mesonotum, dorsal aspect; 66, head, dorsal aspect; 67, habitus, lateral aspect; 68, propodeum and 1st tergite; dorsal aspect; 69, wings; 70, hind leg, lateral aspect; 71, head, frontal aspect. 65, 66, 68, 71: 1.5 × scale-line; 67, 69. 70: scale-line

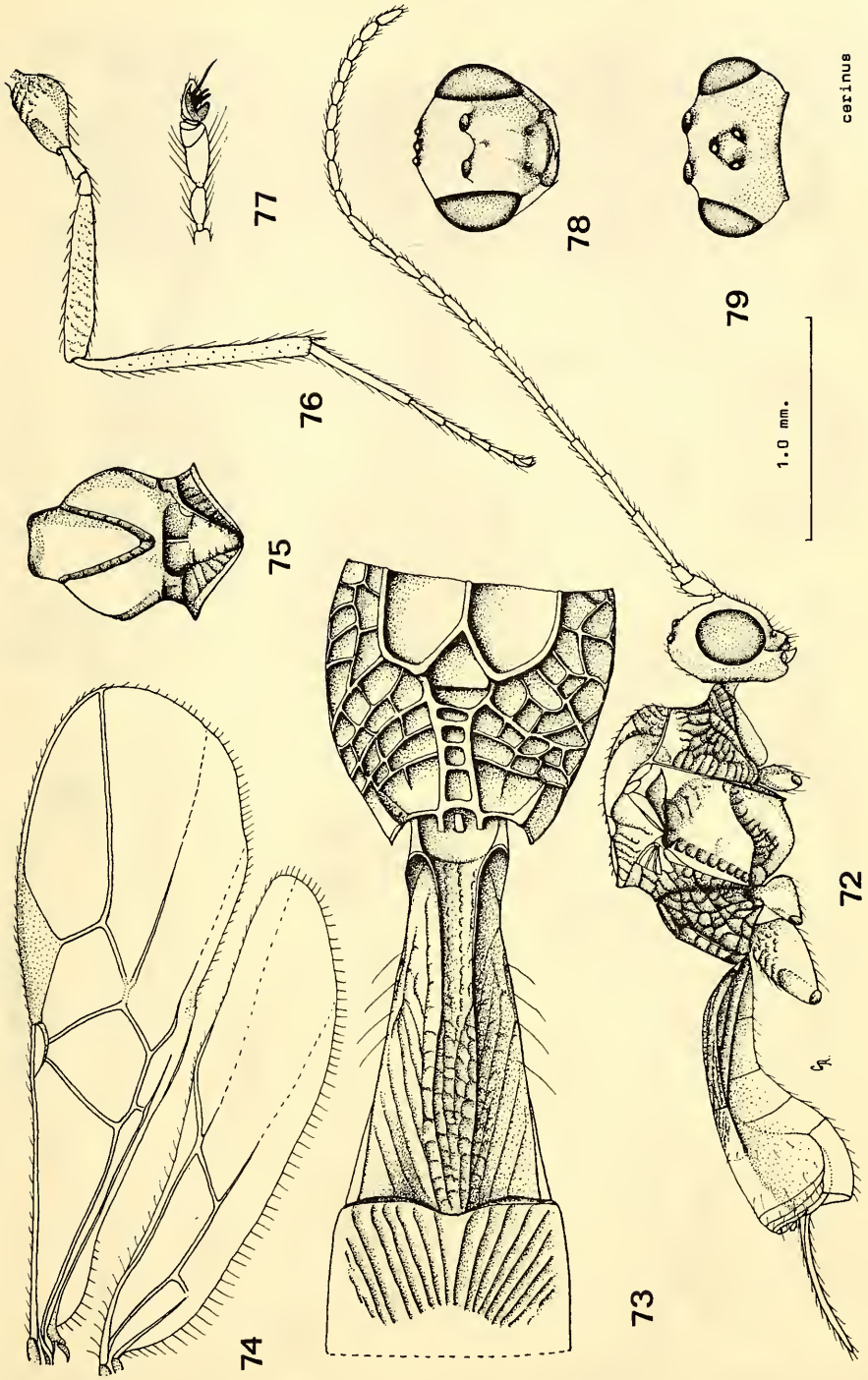

Fig. 72—79, *Blacus* (*Tarpheion*) *cerinus* spec. nov., holotype. 72, habitus, lateral aspect; 73, propodeum, 1st and 2nd tergites, dorsal aspect; 74, wings; 75, mesonotum, dorsal aspect; 76, hind leg, lateral aspect; 77, fore tarsal claw, lateral aspect; 78, head, frontal aspect; 79, head, dorsal aspect 72, 74, 76: scale-line; 75, 78, 79: 1.2 × scale-line; 73, 77: 2.5 × scale-line

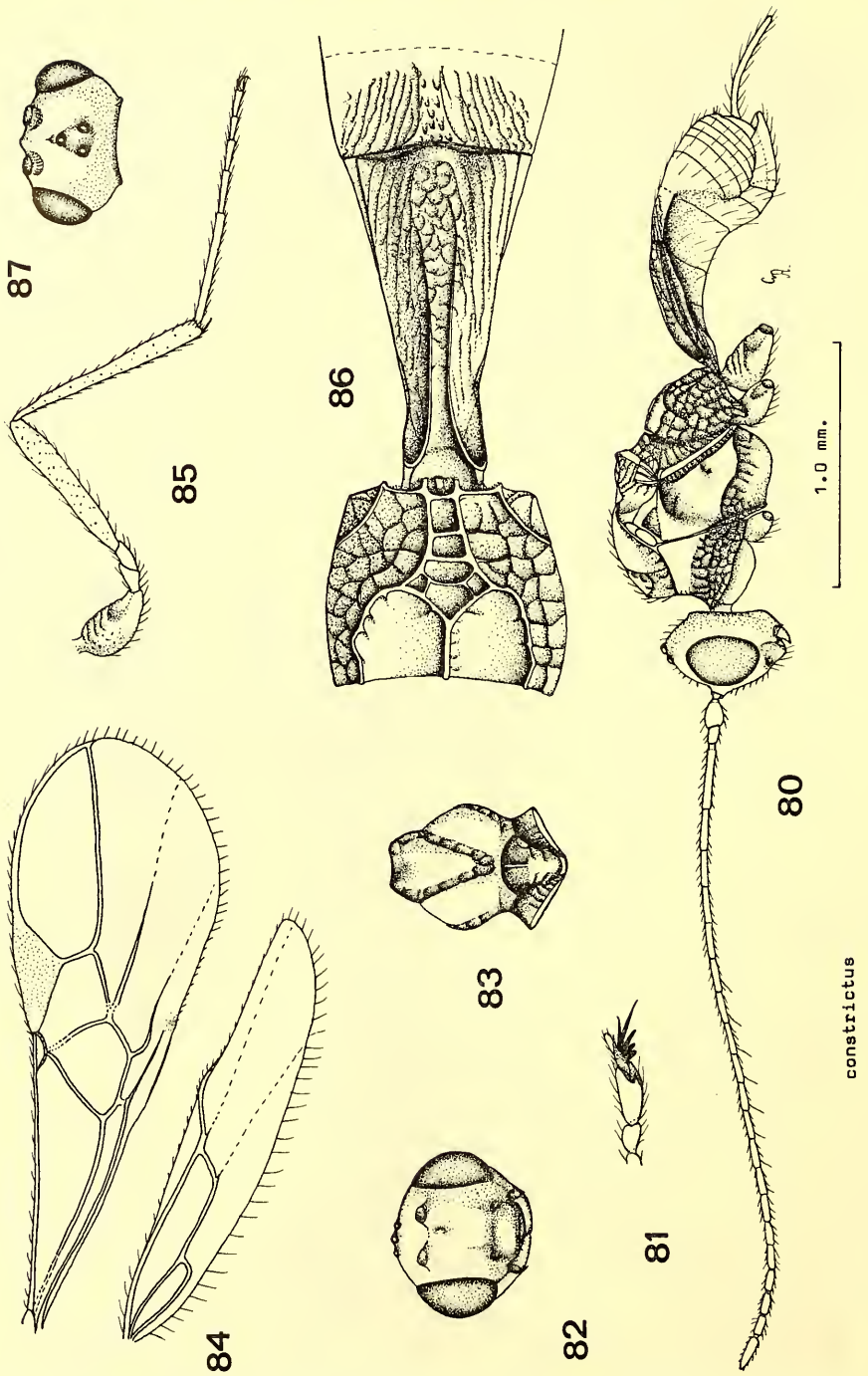

Fig. 80—87, *Blacus* (*Tarpheion*) *constrictus* spec. nov., holotype. 80, habitus, lateral aspect; 81, fore tarsal claw, lateral aspect; 82, head, frontal aspect; 83, mesonotum, dorsal aspect; 84, wings; 85, hind leg, lateral aspect; 86, propodeum, 1st and 2nd tergites, dorsal aspect; 87, head, dorsal aspect. 80, 84, 85: scale-line; 82, 83, 87: 1.2 × scale-line; 81, 86: 2.5 × scale-line

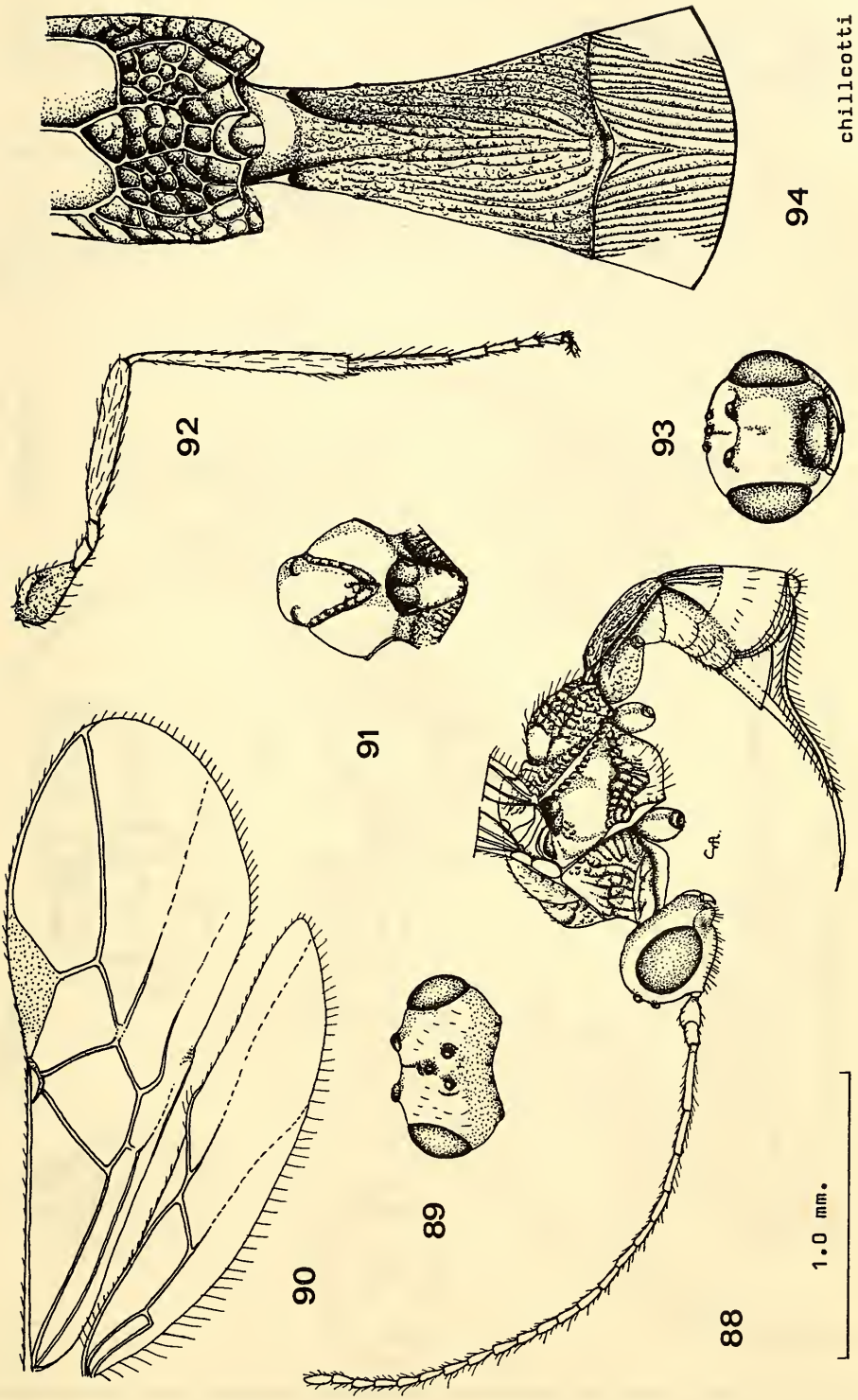

Fig. 88—94, *Blacus* (*Tarpheion*) *chillcotti* spec. nov., holotype. 88, habitus, lateral aspect; 89, head, dorsal aspect; 90, wings; 91, mesonotum, dorsal aspect; 92, hind leg, lateral aspect; 93, head, frontal aspect; 94, propodeum, 1st and 2nd tergites, dorsal aspect. 88, 90, 92: scale-line; 89, 91, 93: 1.2 × scale-line; 94: 2.5 × scale-line

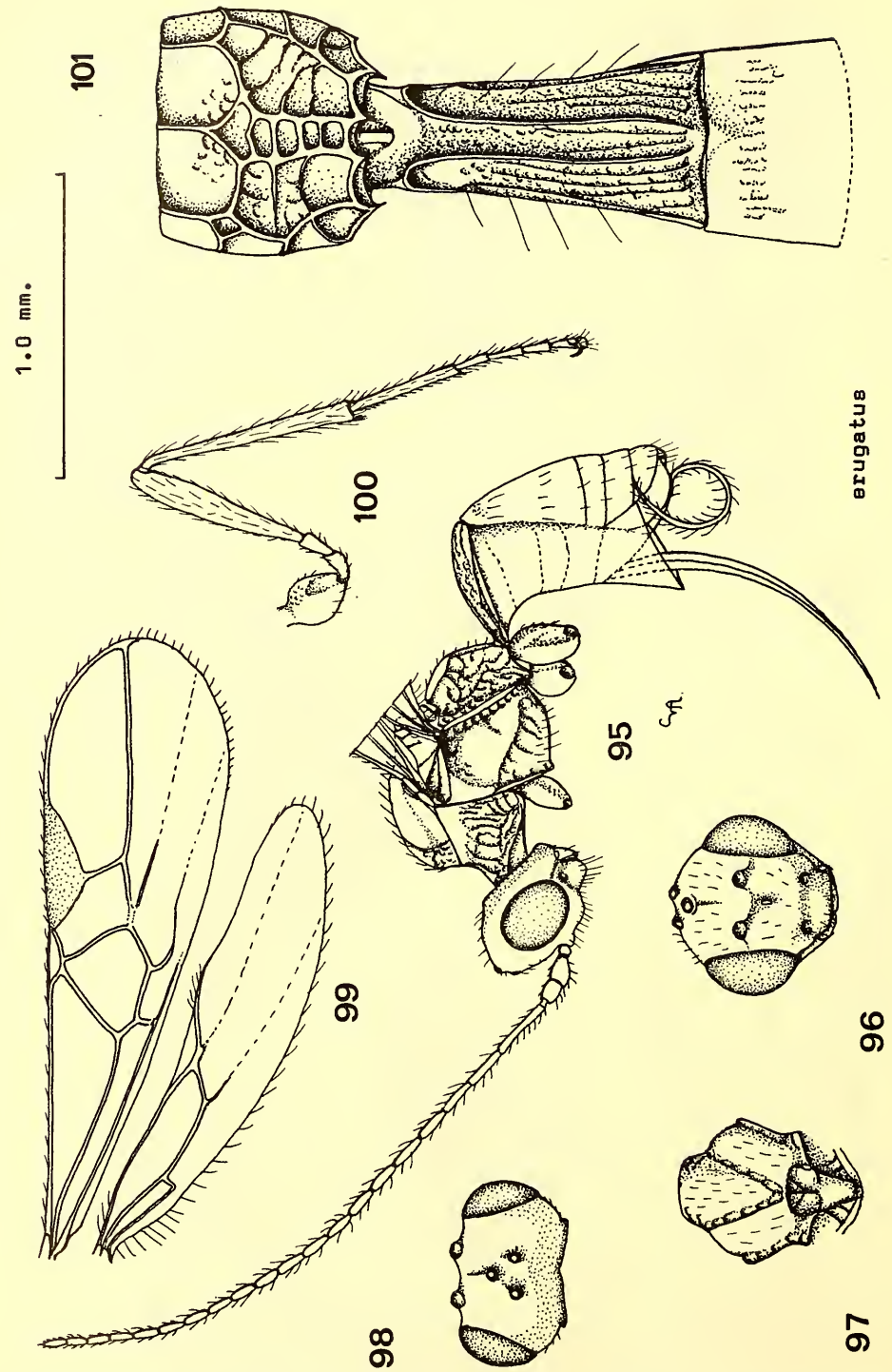

Fig. 95—101, *Blacus* (*Tarpheion*) *erugatus* spec. nov., holotype. 95, habitus, lateral aspect; 96, head, frontal aspect; 97, mesonotum, dorsal aspect; 98, head, dorsal aspect; 99, wings; 100, hind leg, lateral aspect; 101, propodeum, 1st and 2nd tergites. 95, 99, 100: scale-line; 96—98: 1.2 × scale-line; 101: 2.5 × scale-line

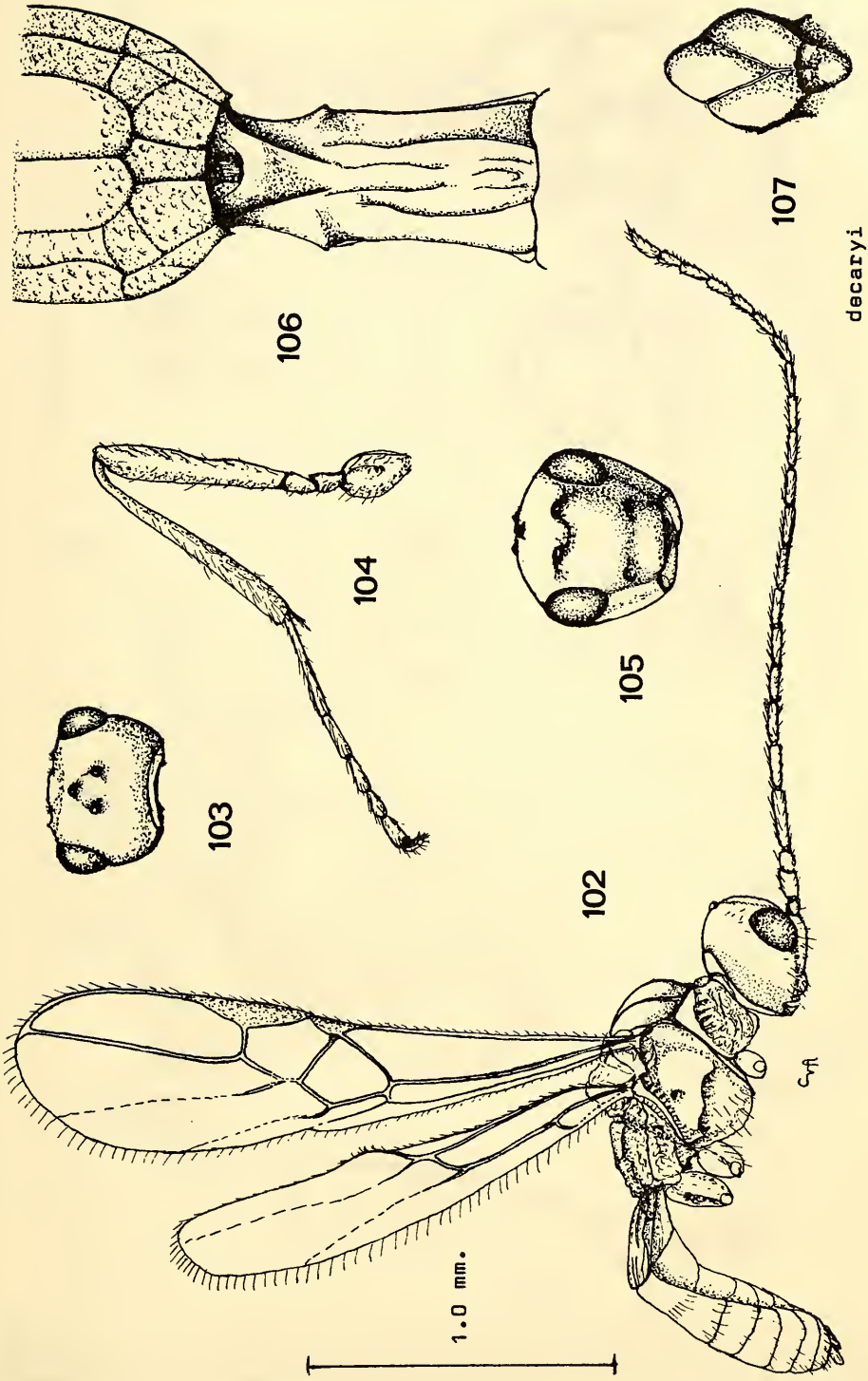

Fig. 102—107, *Blacus* (*Tarpheion*) *decaryi* Granger, holotype. 102, habitus, lateral aspect; 103, head, dorsal aspect; 104, hind leg, lateral aspect; 105, head, frontal aspect; 106, propodeum and 1st tergite, dorsal aspect; 107, mesonotum, dorsal aspect. 102, 104: scale-line; 103, 105, 107: 1.2 × scale-line; 106, 3.0 × scale-line

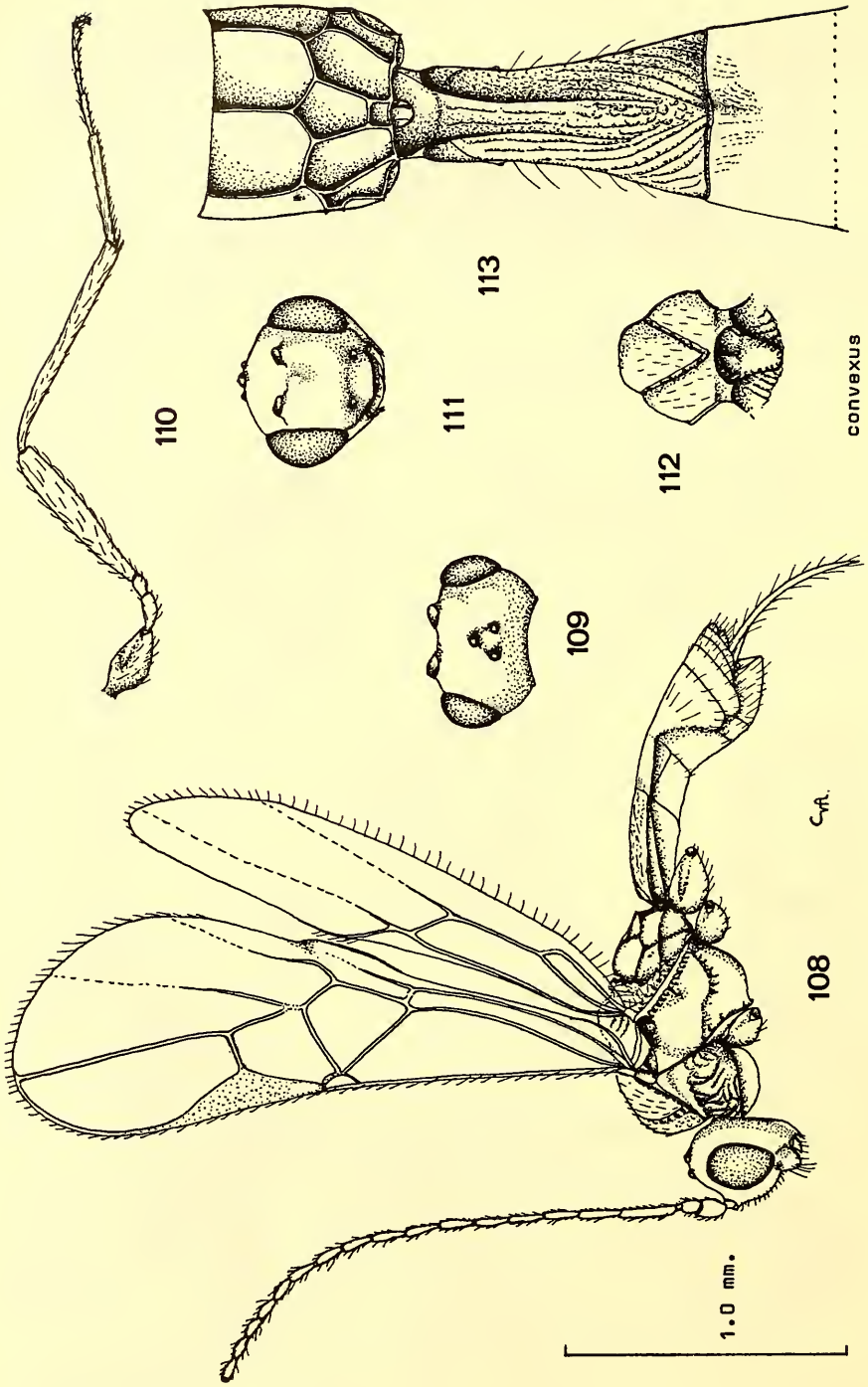

Fig. 108—113, *Blacus* (*Tarpheion*) *convexus* spec. nov., holotype. 108, habitus, lateral aspect; 109, head, dorsal aspect; 110, hind leg, lateral aspect; 111, head, frontal aspect; 112, mesonotum, dorsal aspect; 113, propodeum, 1st and 2nd tergites. 108, 110: scale-line; 109—112: 1.2 × scale-line; 113: 2.5 × scale-line

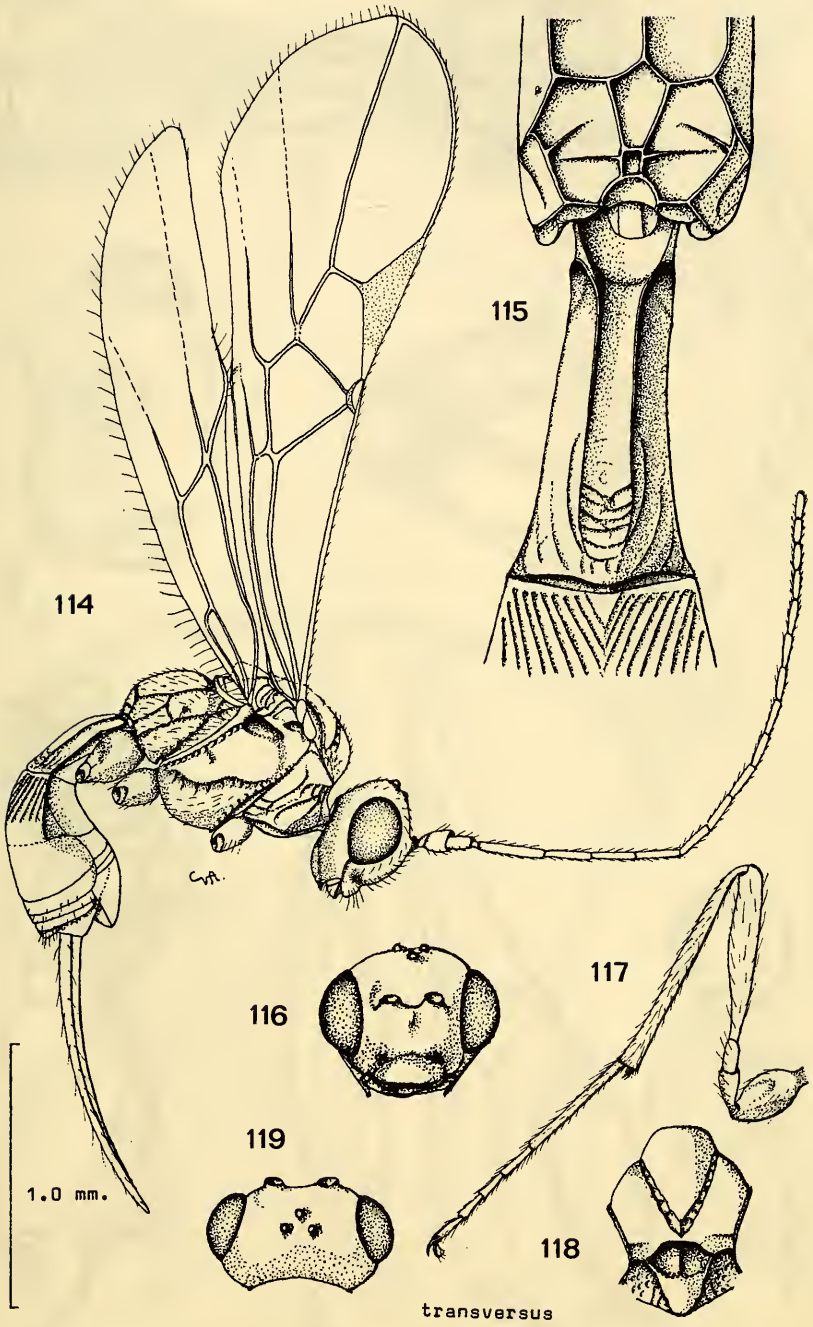

Fig. 114—119, *Blacus* (*Tarpheion*) *transversus* spec. nov., holotype. 114, habitus, lateral aspect; 115, propodeum, 1st and 2nd tergites; 116, head, frontal aspect; 117, hind leg, lateral aspect; 118, mesonotum, dorsal aspect; 119, head, dorsal aspect. 114, 117: scale-line; 116, 118, 119: 1.2 × scale-line; 115: 3.0 × scale-line

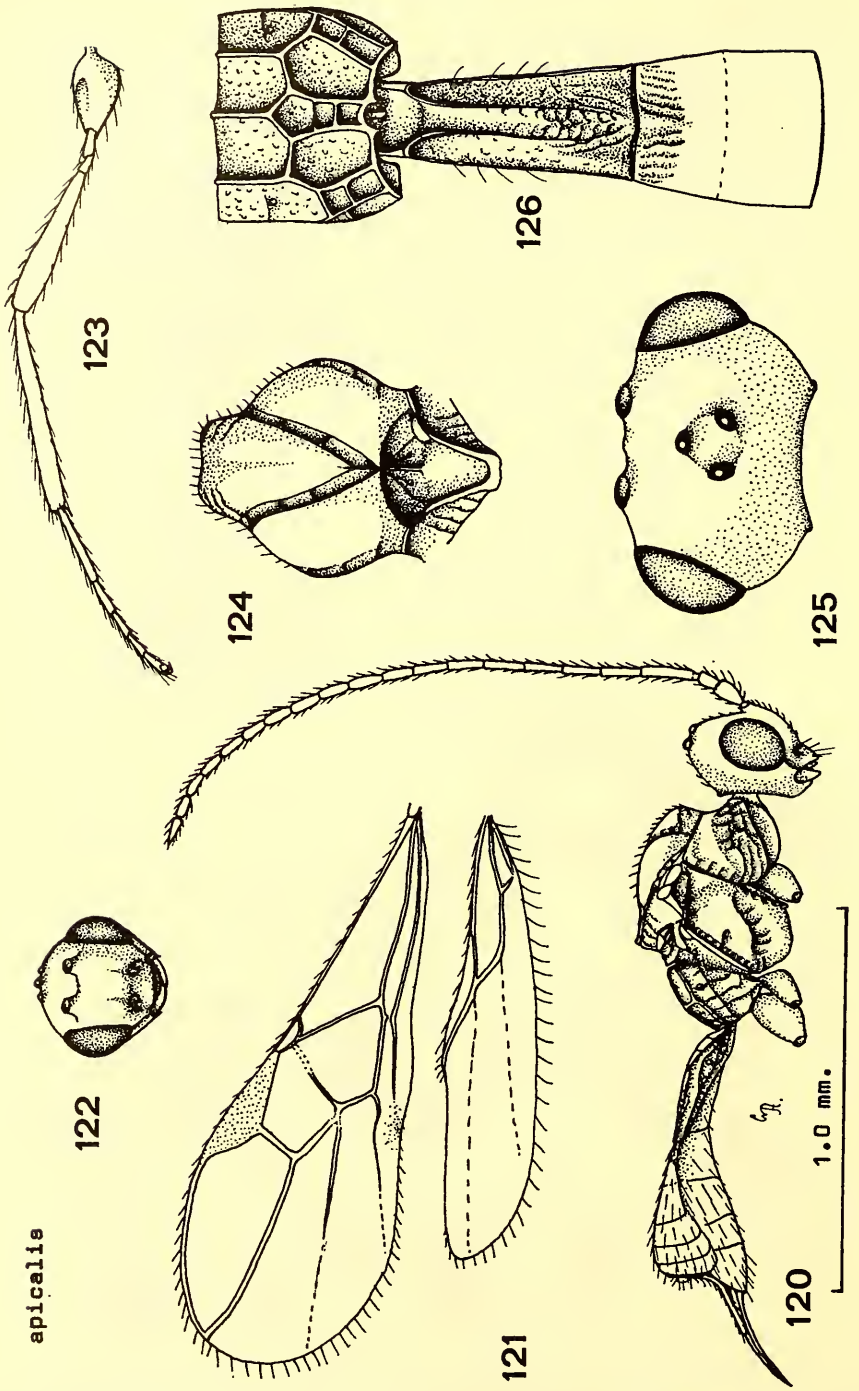

Fig. 120—126, *Blacus* (*Tarpheion*) *apicalis* spec. nov., holotype. 120, habitus, lateral aspect; 121, wings; 122, head, frontal aspect; 123, hind leg, lateral aspect; 124, mesonotum, dorsal aspect; 125, head, dorsal aspect; 126, propodeum, 1st-3rd tergites, dorsal aspect. 120, 121, 123: scale-line; 122, 124—126: 2.1 × scale-line

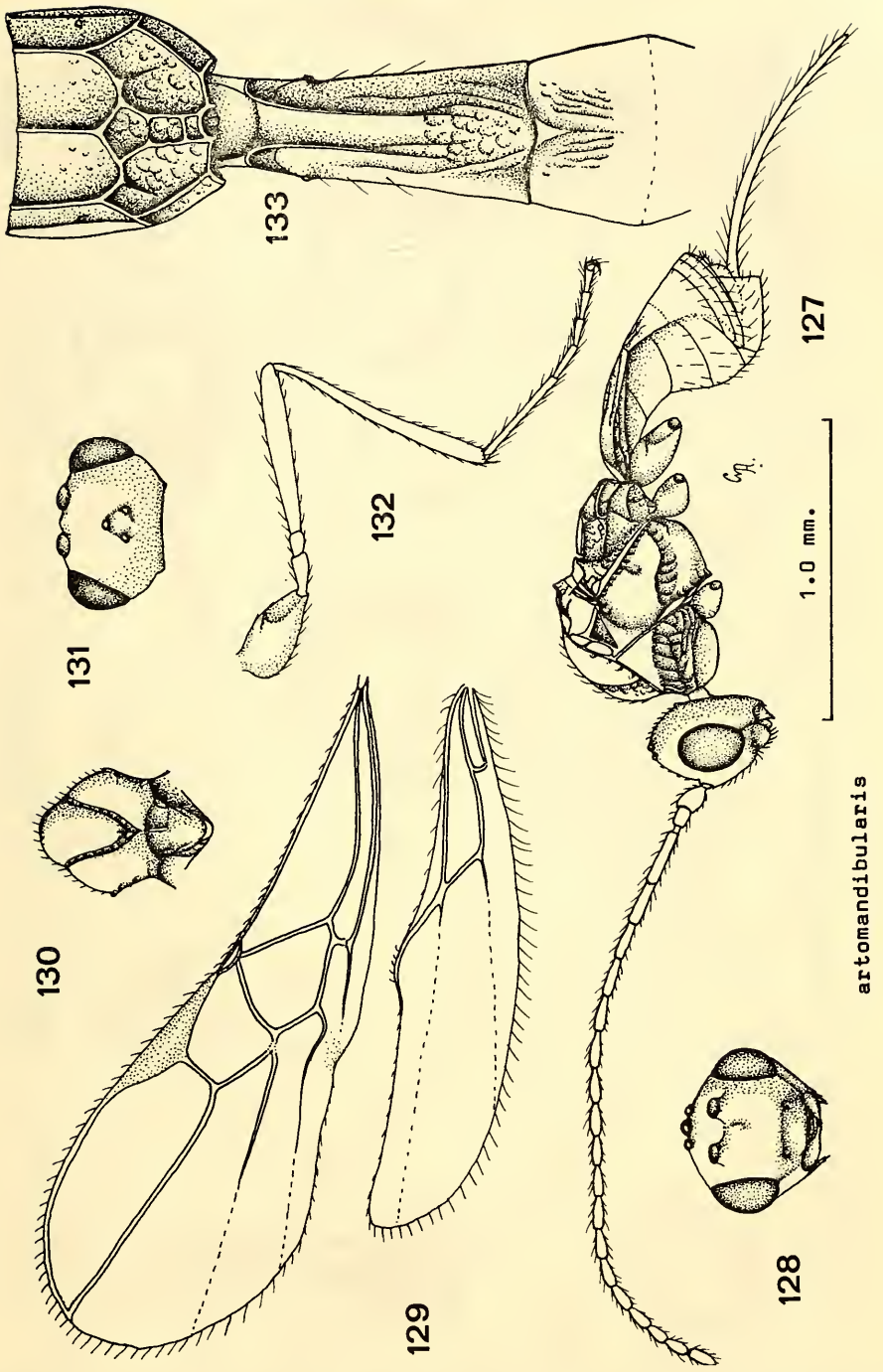

Fig. 127—133, *Blacus* (*Tarpheion*) *artomandibularis* spec. nov., holotype. 127, habitus, lateral aspect; 128, head, frontal aspect; 129, wings; 130, mesonotum, dorsal aspect; 131, head, dorsal aspect; 132, hind leg, lateral aspect; 133, 1st and 2nd tergites, dorsal aspect. 127, 129, 132: scale-line; 128, 130, 131: 1.2 × scale-line; 133: 2.5 × scale-line

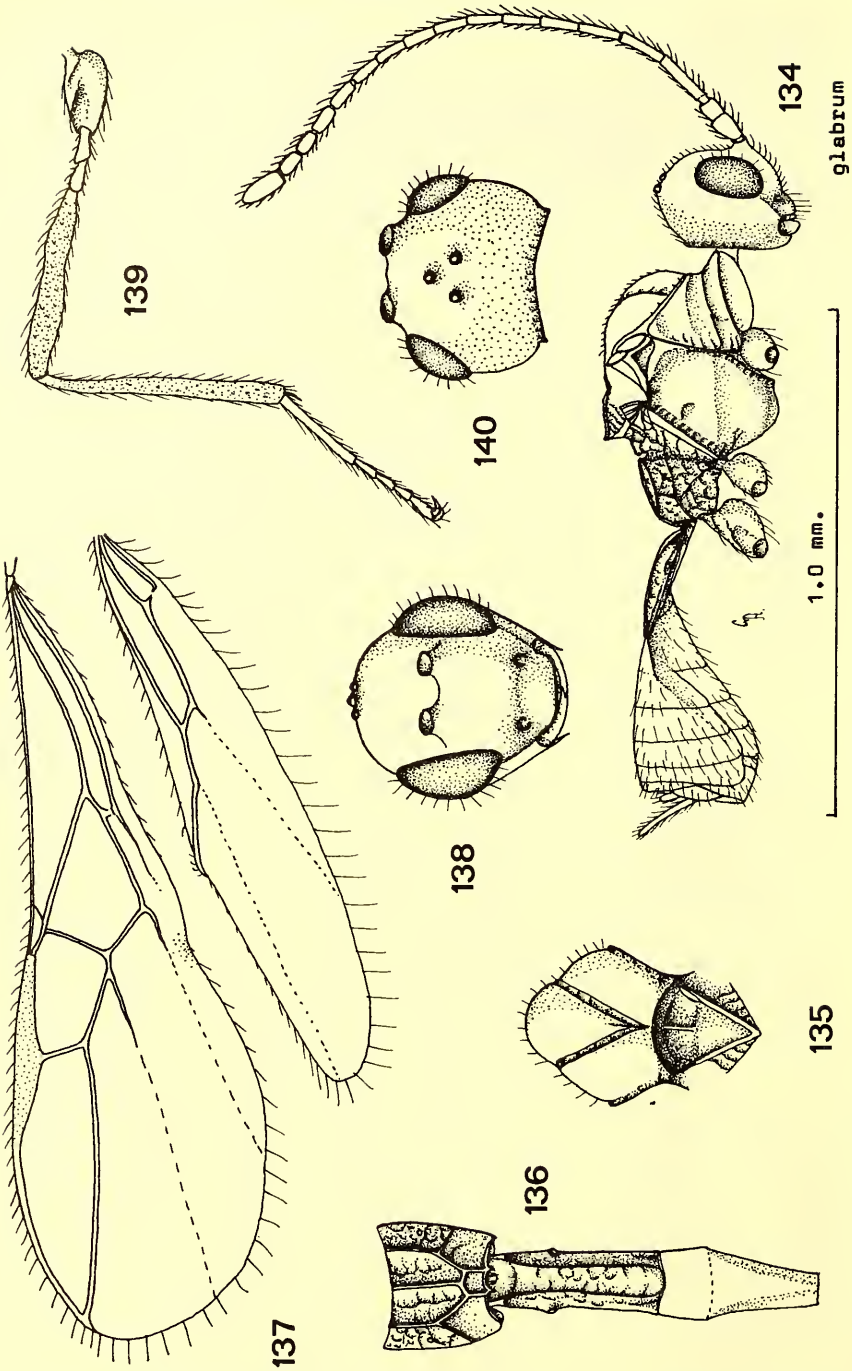

Fig. 134—140, *Blacus* (*Contochorus*) *glabrum* spec. nov., holotype. 134, habitus, lateral aspect; 135, mesonotum, dorsal aspect; 136, propodeum, 1st-3rd tergites, dorsal aspect; 137, wings; 138, head, frontal aspect; 139, hind leg, lateral aspect; 140, head, dorsal aspect. 134, 137, 139: scale-line; 135, 136, 138, 140: 1.5 × scale-line

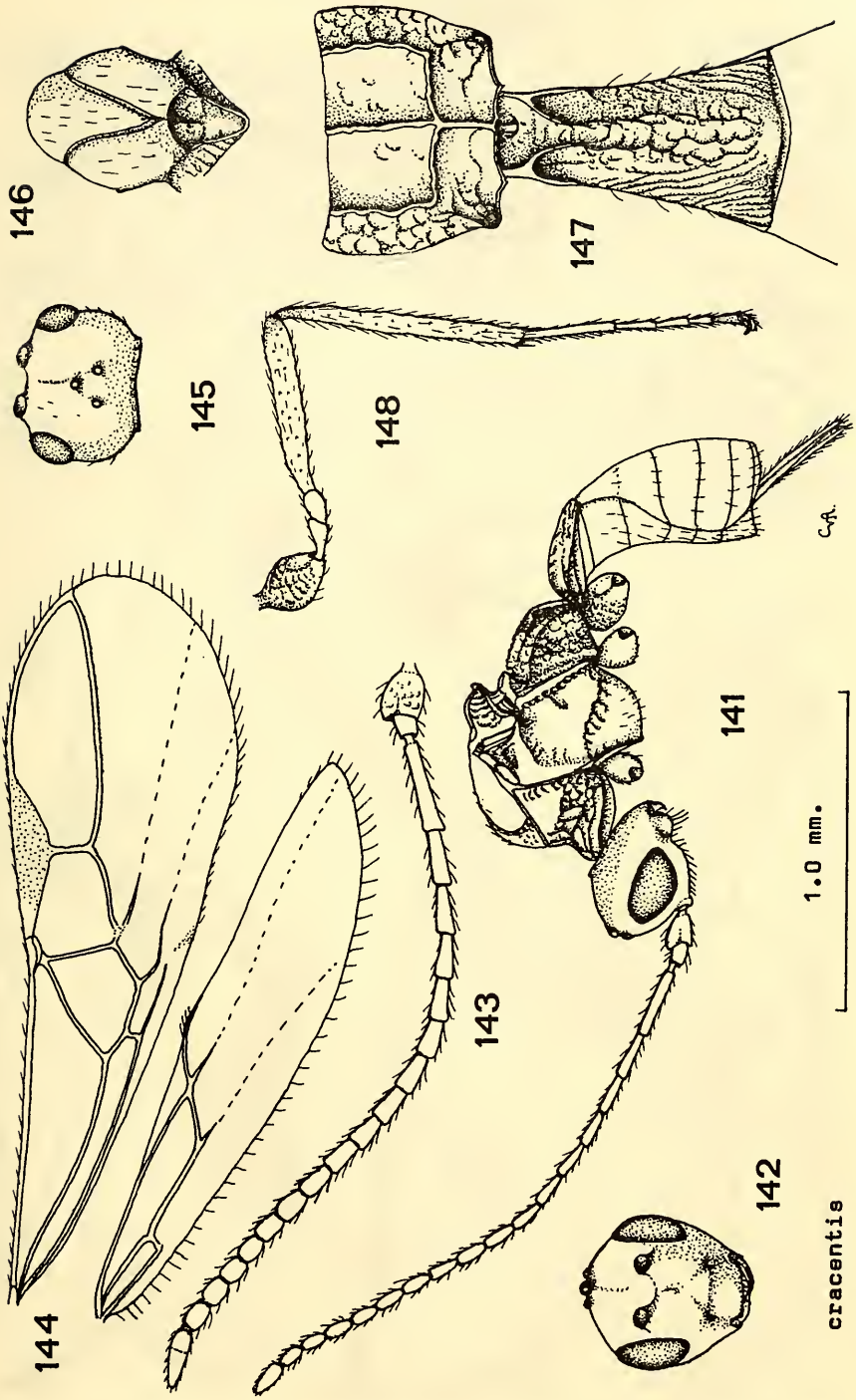

Fig. 141—148, *Blacus* (*Ganychorus*) *cracentis* spec. nov.; 141, 142, 144—148, holotype; 143, paratype. 141, habitus, lateral aspect; 142, head, frontal aspect; 143, antenna, lateral aspect; 144, wings; 145, head, dorsal aspect; 146, mesonotum, dorsal aspect; 147, propodeum and 1st tergite, dorsal aspect; 148, hind leg, lateral aspect. 141, 143, 144, 148: scale-line; 142, 145, 146: 1.2 × scale-line; 147: 2.5 × scale-line

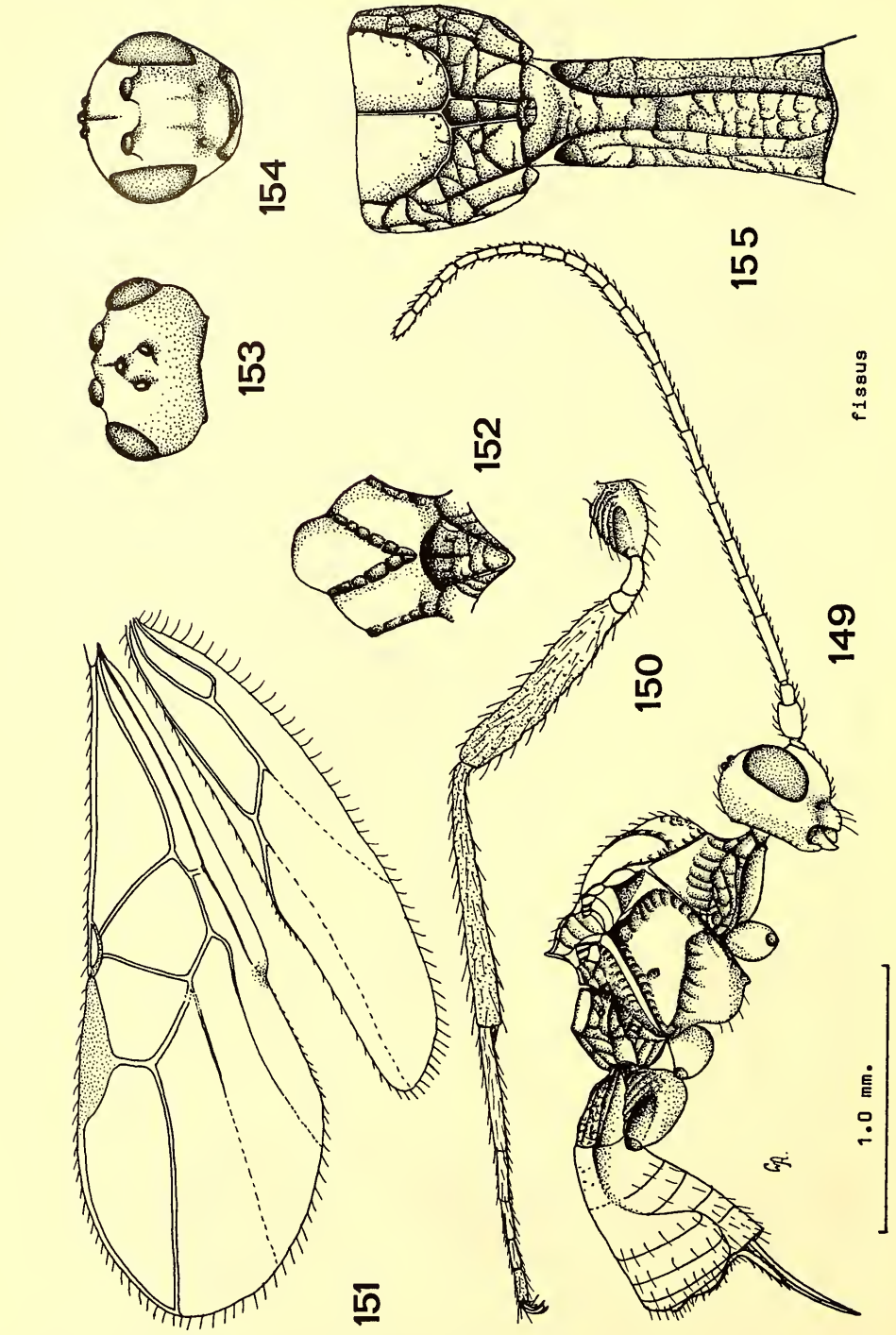

Fig. 149—155, *Blacus* (*Ganychorus*) *fissus* spec. nov., holotype. 149, habitus, lateral aspect; 150, hind leg, lateral aspect; 151, wings; 152, mesonotum, dorsal aspect; 153, head, dorsal aspect; 153, head, frontal aspect; 155, propodeum, and 1st tergite, dorsal aspect. 149—151: scale-line; 152—154: 1.2 × scale-line; 155: 2.5 × scale-line

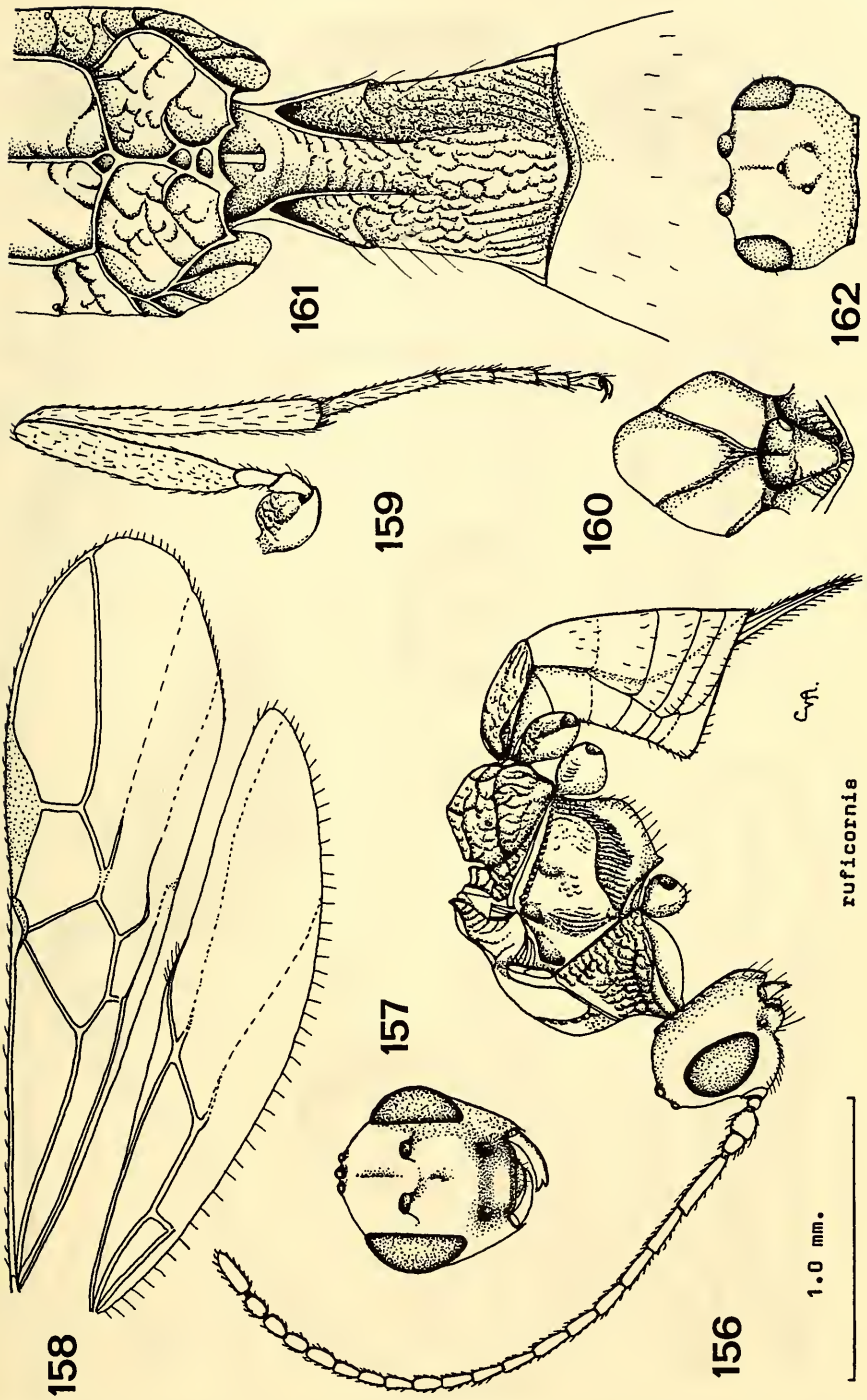

Fig. 156—162, *Blacus* (*Ganychorus*) *ruficornis* (Nees), Val Marie (Saskatchewan). 156, habitus, lateral aspect; 157, head, frontal aspect; 158, wings; 159, hind leg, lateral aspect; 160, mesonotum, dorsal aspect; 161, propodeum and 1st tergite, dorsal aspect; 162, head, dorsal aspect. 156, 158, 159: scale-line; 157, 160, 162: 1.2 × scale-line; 161: 2.5 × scale-line

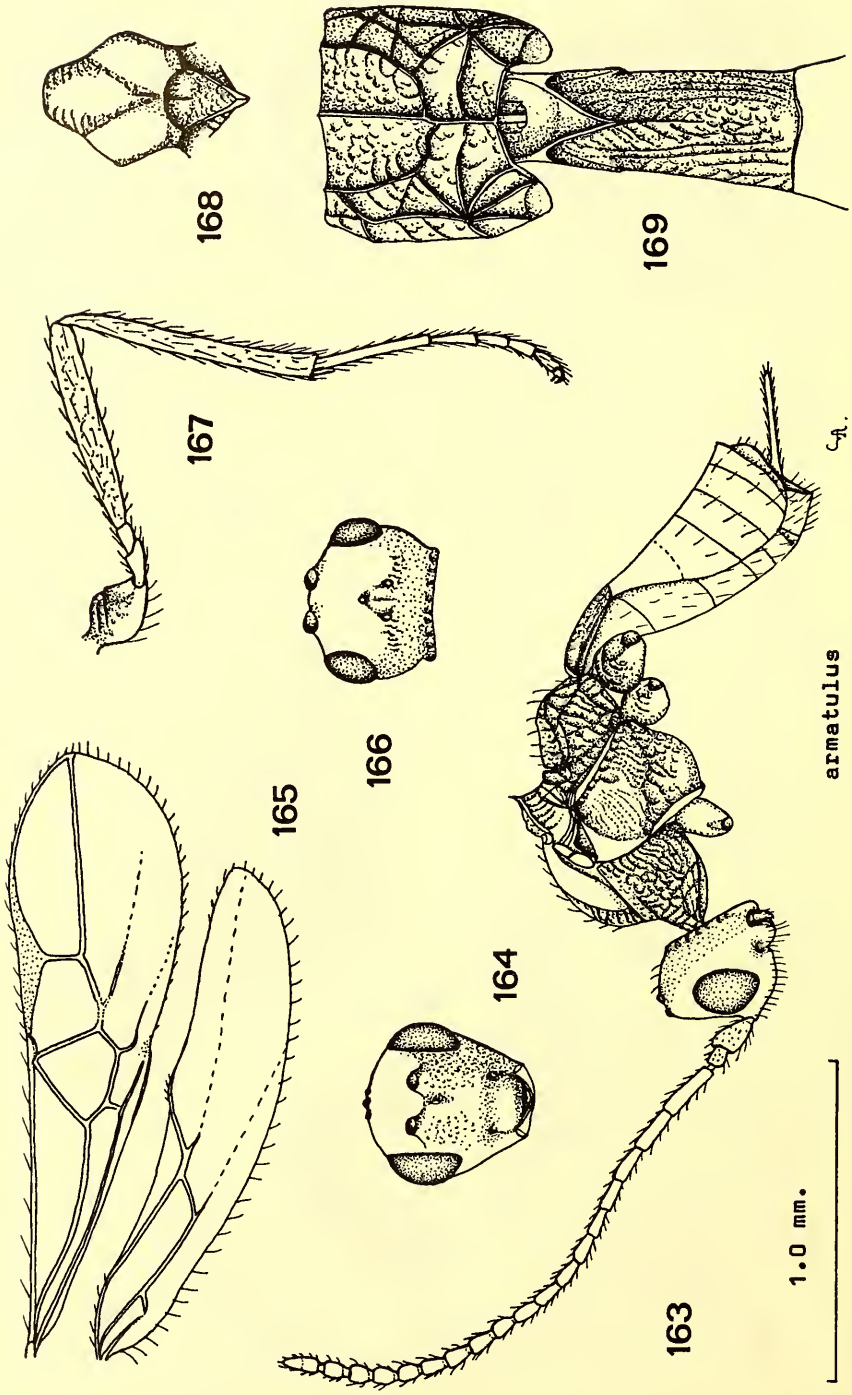

Fig. 163—169, *Blacus* (*Ganychorus*) *armatulus* Ruthe, Innisville (Ontario). 163, habitus, lateral aspect; 164, head, frontal aspect; 165, wings; 166, head, dorsal aspect; 167, hind leg, lateral aspect; 168, mesonotum, dorsal aspect; 169, propodeum and 1st tergite, dorsal aspect. 163, 165, 167: scale-line; 164, 166, 168: 1.2 × scale-line; 169: 2.5 × scale-line

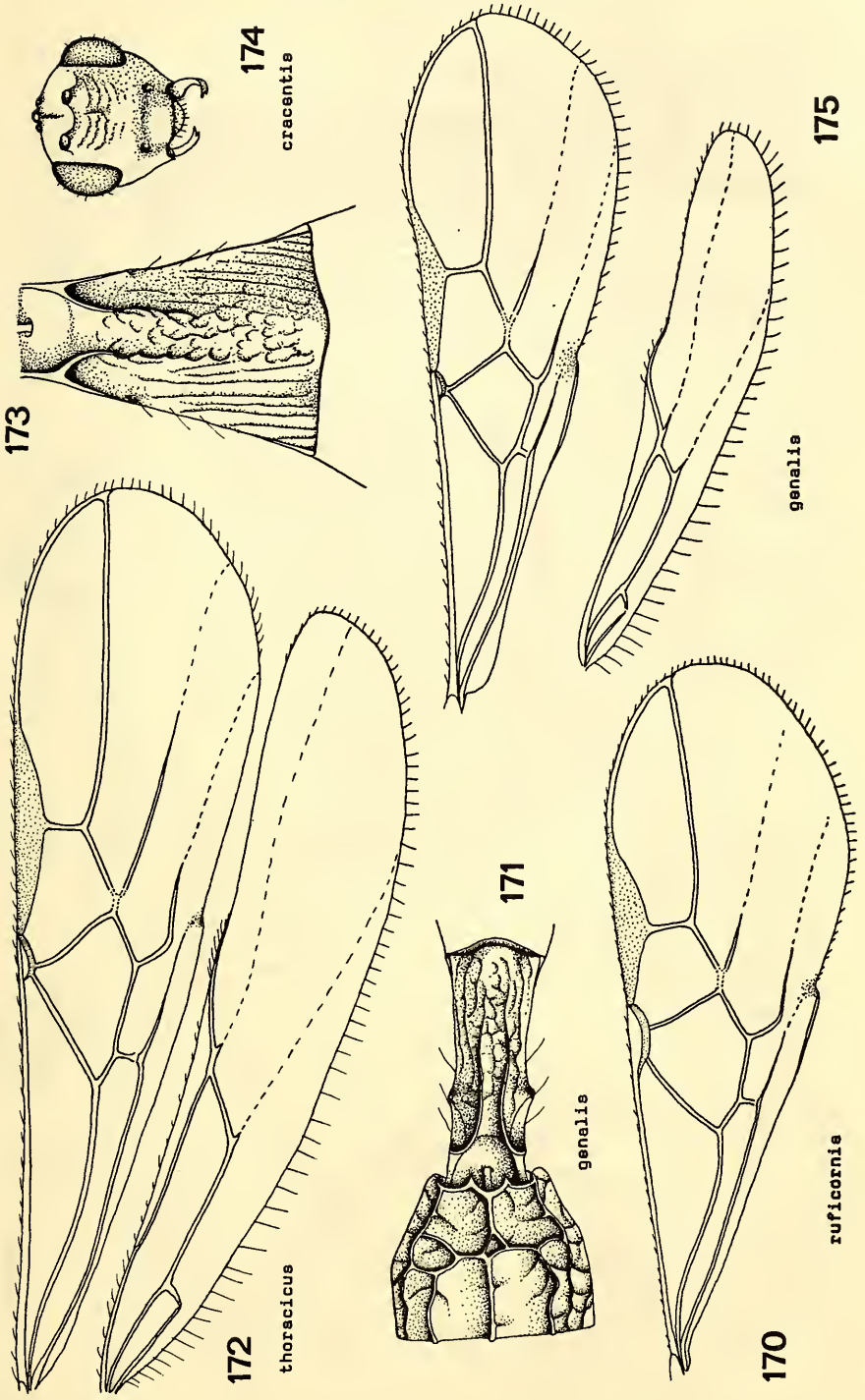

Fig. 170—175. 170, *Blacus* (*Ganychorus*) *ruficornis* (Nees), ♂, Kerrville (Texas), fore wing; 171, 175, *Blacus* (*G.*) *genalis* Haeselbarth, ♀, Lubumbashi (Zaïre); 171, propodeum and 1st tergite; 175, wings; 172, *Blacus* (*G.*) *thoracicus* spec. nov., holotype, wings; 173, 174, *Blacus* (*G.*) *cracentis* spec. nov., paratype; 174, 1st tergite; 175, head, frontal aspect. 170, 172: scale-line of Fig. 176; 171, 173: 2.5 × scale-line of Fig. 176; 174, 175: 1.2 × scale-line of Fig. 176

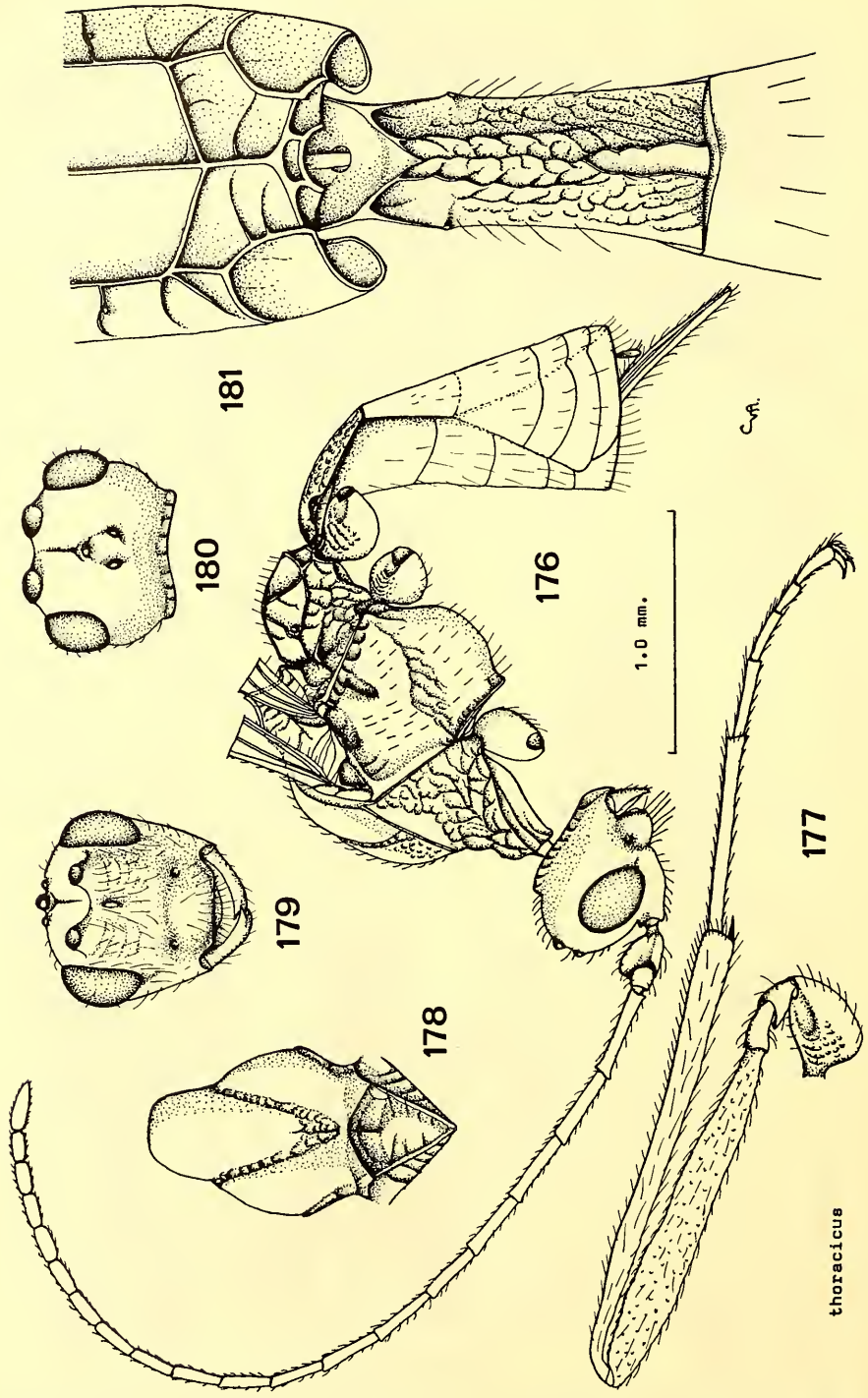

Fig. 176—181, *Blacus* (*Ganychorus*) *thoracicus* spec. nov., holotype. 176, habitus, lateral aspect; 177, hind leg, lateral aspect; 178, mesonotum, dorsal aspect; 179, head, frontal aspect; 180, head, dorsal aspect; 181, propodeum and 1st tergite, dorsal aspect. 176, 177: scale-line; 178—180: 1.2 × scale-line; 181: 2.5 × scale-line

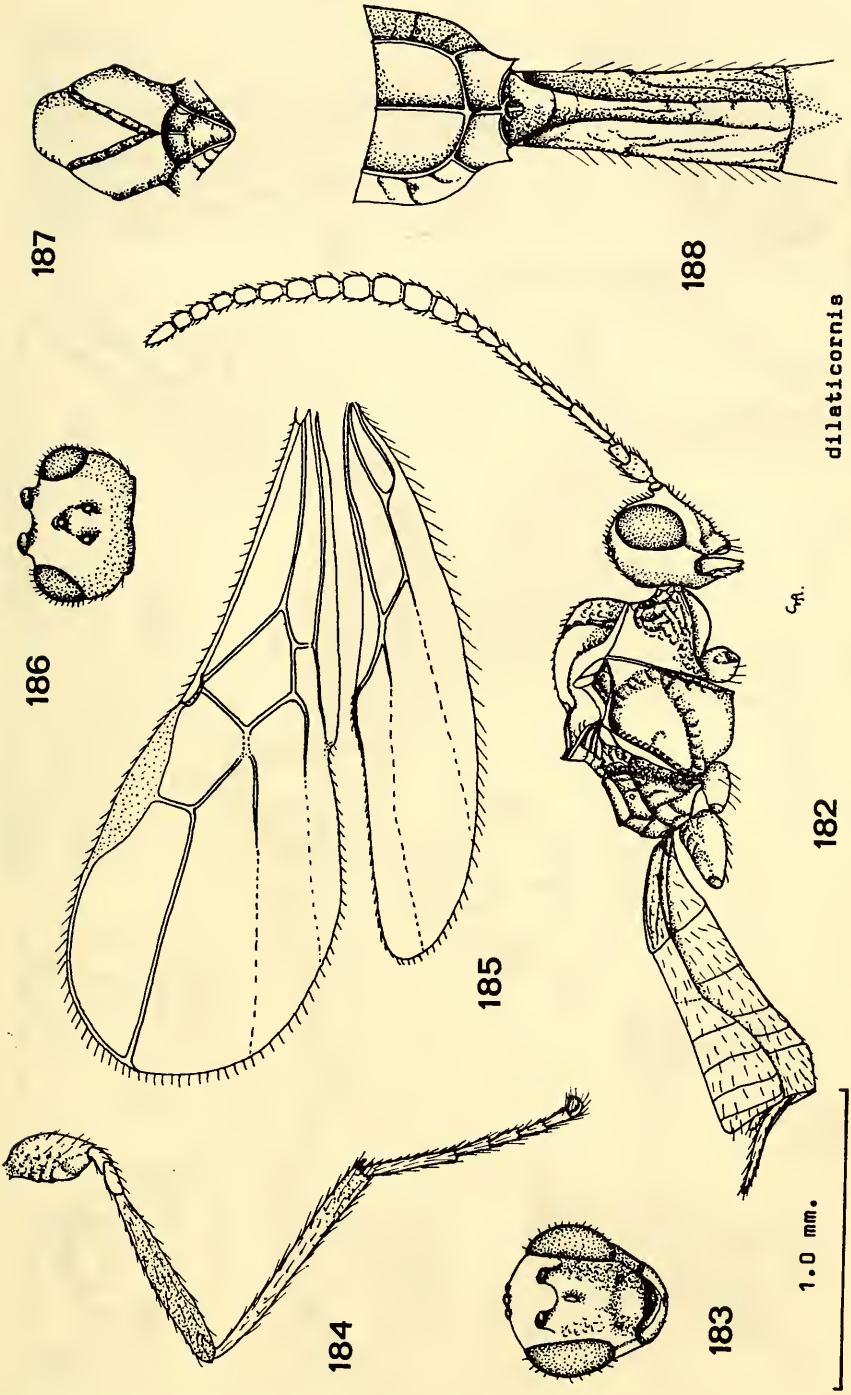

Fig. 182—188, *Blacus* (*Ganychorus*) *dilaticornis* spec. nov., holotype. 182, habitus, lateral aspect; 183, head, frontal aspect; 184, hind leg, lateral aspect; 185, wings; 186, head, dorsal aspect; 187, mesonotum, dorsal aspect; 188, propodeum and 1st tergite, dorsal aspect. 182, 184, 185: scale-line; 183, 186, 187: 1.2 × scale-line; 188: 2.5 × scale-line

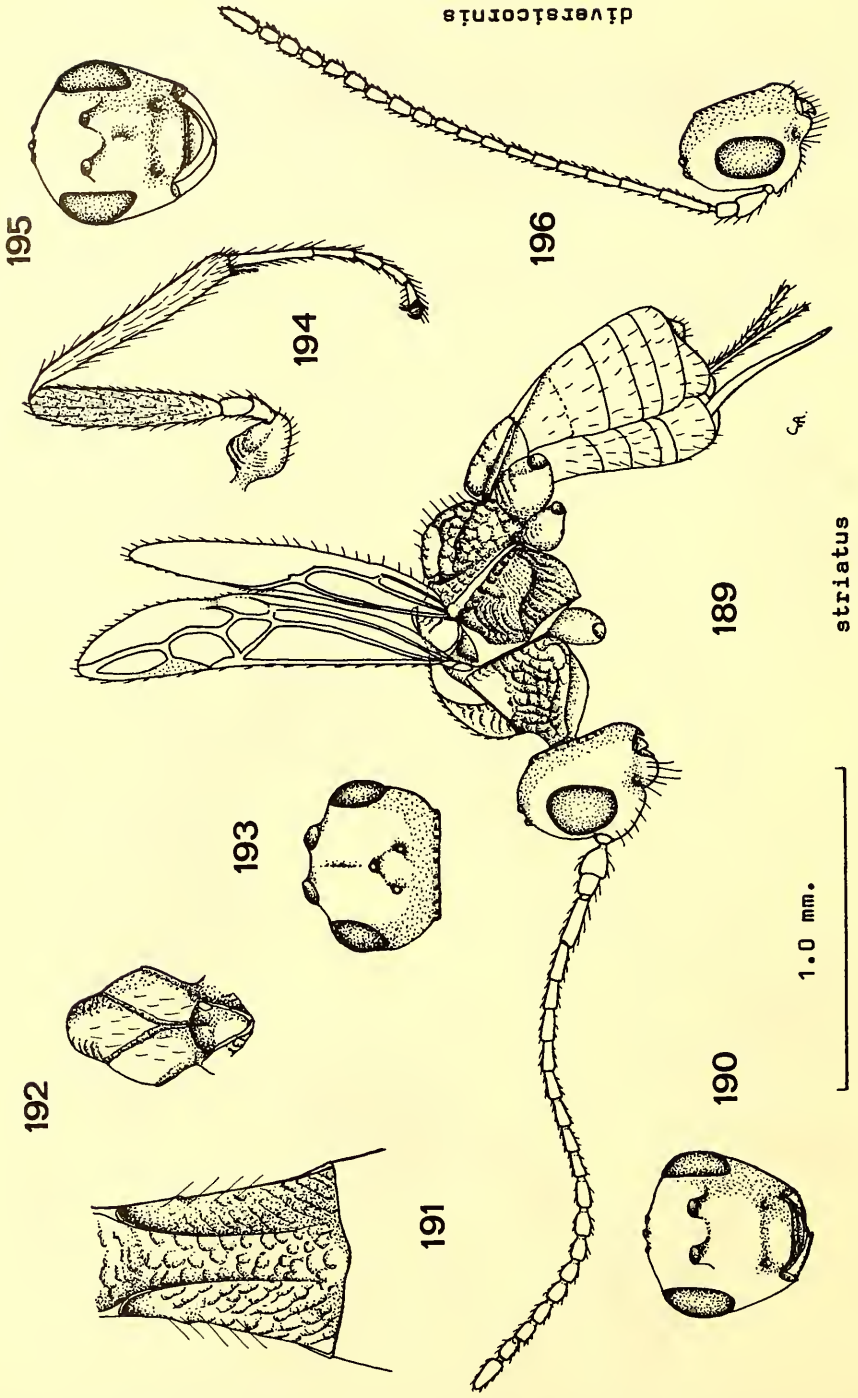

Fig. 189—196. 189—194, *Blacus* (*Ganychorus*) *striatus* spec. nov., micropterous paratype; 189, habitus, lateral aspect; 190, head, frontal aspect; 191, 1st tergite, dorsal aspect; 192, mesonotum, dorsal aspect; 193, head, dorsal aspect 194, hind leg, lateral aspect. 195, 196, *Blacus* (*G.*) *diversicornis* (Nees), Lübke (West Germany); 195, head, frontal aspect; 196, head, lateral aspect. 189, 194, 196: scale-line; 190, 192, 193, 195: 1.2 × scale-line; 191: 2.5 × scale-line

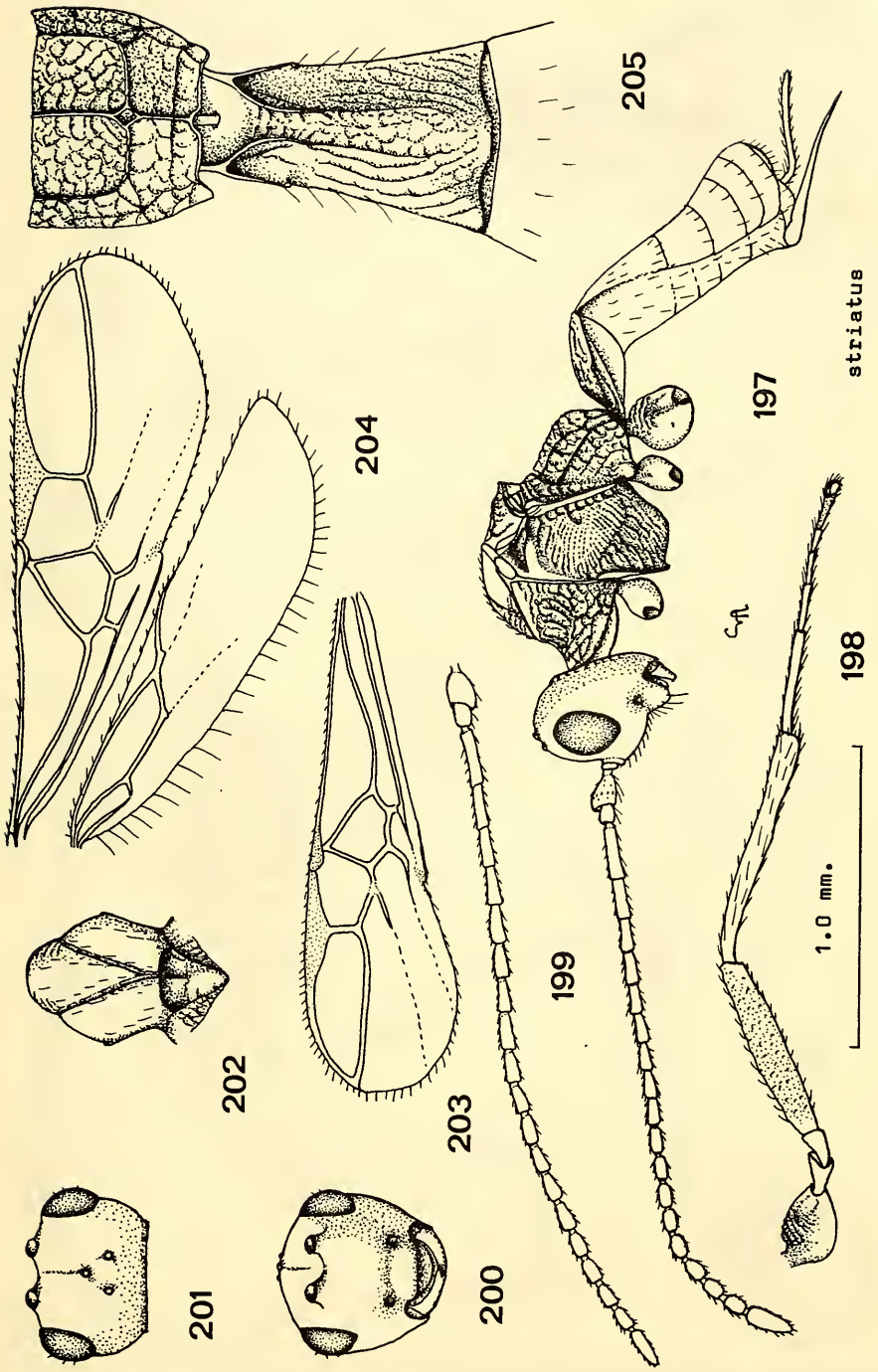

Fig. 197—205, *Blacus* (*Ganychorus*) *striatus* spec. nov., 197, 198, 200—205, holotype; 199, 203, ♂, Chatterton (Ontario). 197, habitus, lateral aspect; 198, hind leg, lateral aspect; 199, antenna, lateral aspect; 200, head, frontal aspect; 201, head, dorsal aspect; 202, mesonotum, dorsal aspect; 203, fore wing; 204, wings; 205, propodeum and 1st tergite. 197—199, 203—204: scale-line; 200—202: 1.2 × scale-line; 205: 2.5 × scale-line

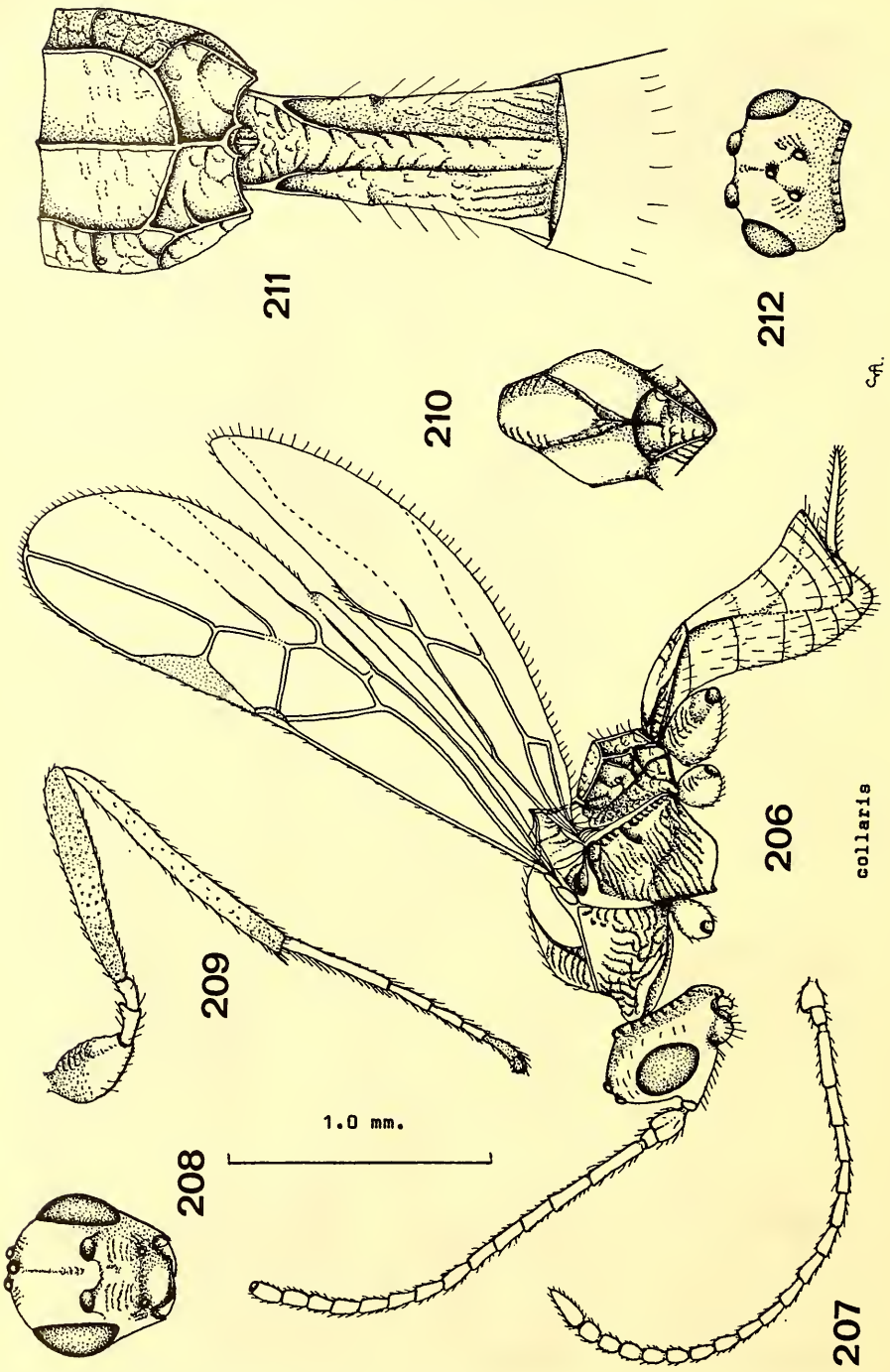

Fig. 206—212, *Blacus* (*Ganychorus*) *collaris* (Ashmead); 206, 208—212, Parke Reserve (Quebec); 207, ♀, Blacksburg (Virginia). 206, habitus, lateral aspect; 207, antenna, lateral aspect; 208, head, frontal aspect; 209, hind leg, lateral aspect; 210, mesonotum, dorsal aspect; 211, propodeum, 1st and 2nd tergites, dorsal aspect; 212, head, dorsal aspect. 206, 207, 209: scale-line; 208, 210, 212: 1.2 × scale-line; 211: 2.5 × scale-line

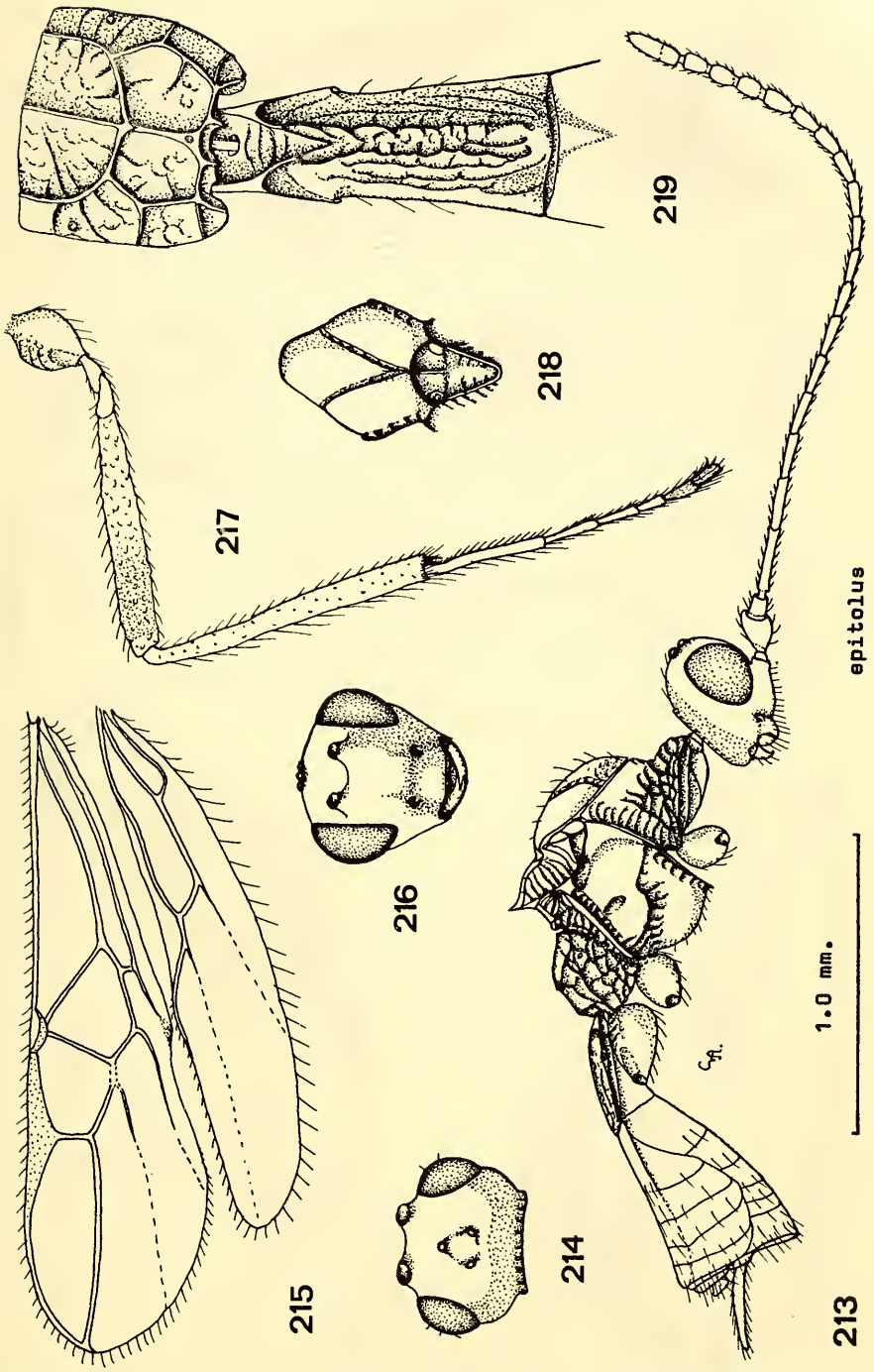

Fig. 213—219, *Blacus* (*Ganychorus*) *epitolus* spec. nov., holotype. 213, habitus, lateral aspect; 214, head, dorsal aspect; 215, wings; 216, head, frontal aspect; 217, hind leg, lateral aspect; 218, mesonotum, dorsal aspect; 219, propodeum and 1st tergite, dorsal aspect. 213, 215, 217: scale-line; 214, 216, 218: 1.2 × scale-line; 219: 2.5 × scale-line

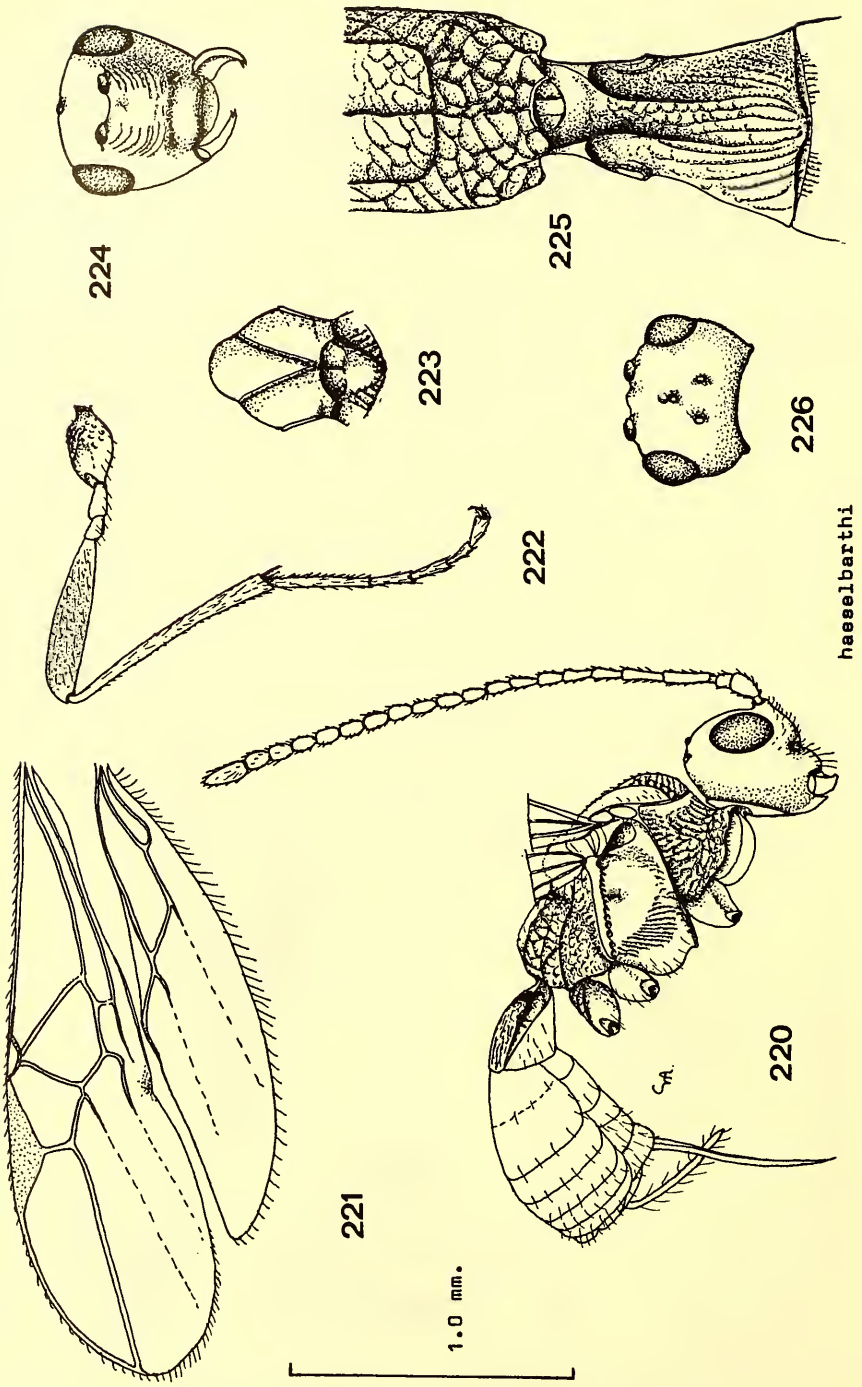

Fig. 220—226, *Blacus* (*Ganychorus*) *haeselbarthi* spec. nov., holotype. 220, habitus, lateral aspect; 221, wings (bent); 22, hind leg, lateral aspect; 223, mesonotum, dorsal aspect; 224, head, frontal aspect; 225, propodeum and 1st tergite, dorsal aspect; 226, head, dorsal aspect. 220, 222: scale-line; 223, 224, 226: 1.2 × scale-line; 225: 2.5 × scale-line

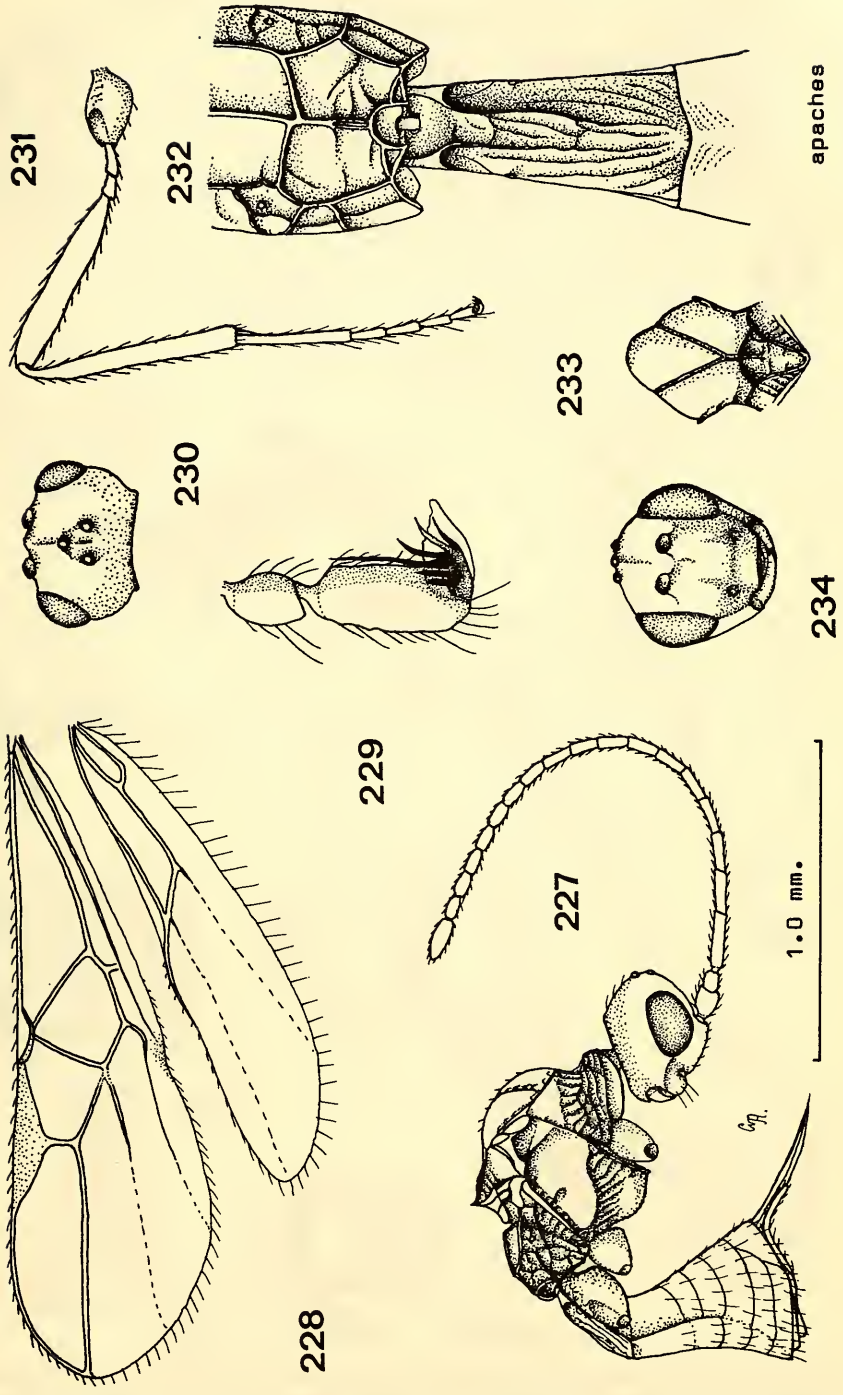

Fig. 227—234, *Blacus* (*Ganychorus*) *apaches* spec. nov., holotype. 227, habitus, lateral aspect; 228, wings; 229, middle tarsal claw, lateral aspect; 230, head, dorsal aspect; 231, hind leg, lateral aspect; 232, propodeum and 1st tergite, dorsal aspect; 233, mesonotum, dorsal aspect; 234, head, frontal aspect. 227, 228, 231: scale-line; 229: 5.0 × scale-line; 230, 233, 234: 1.2 × scale-line; 232: 2.5 × scale-line

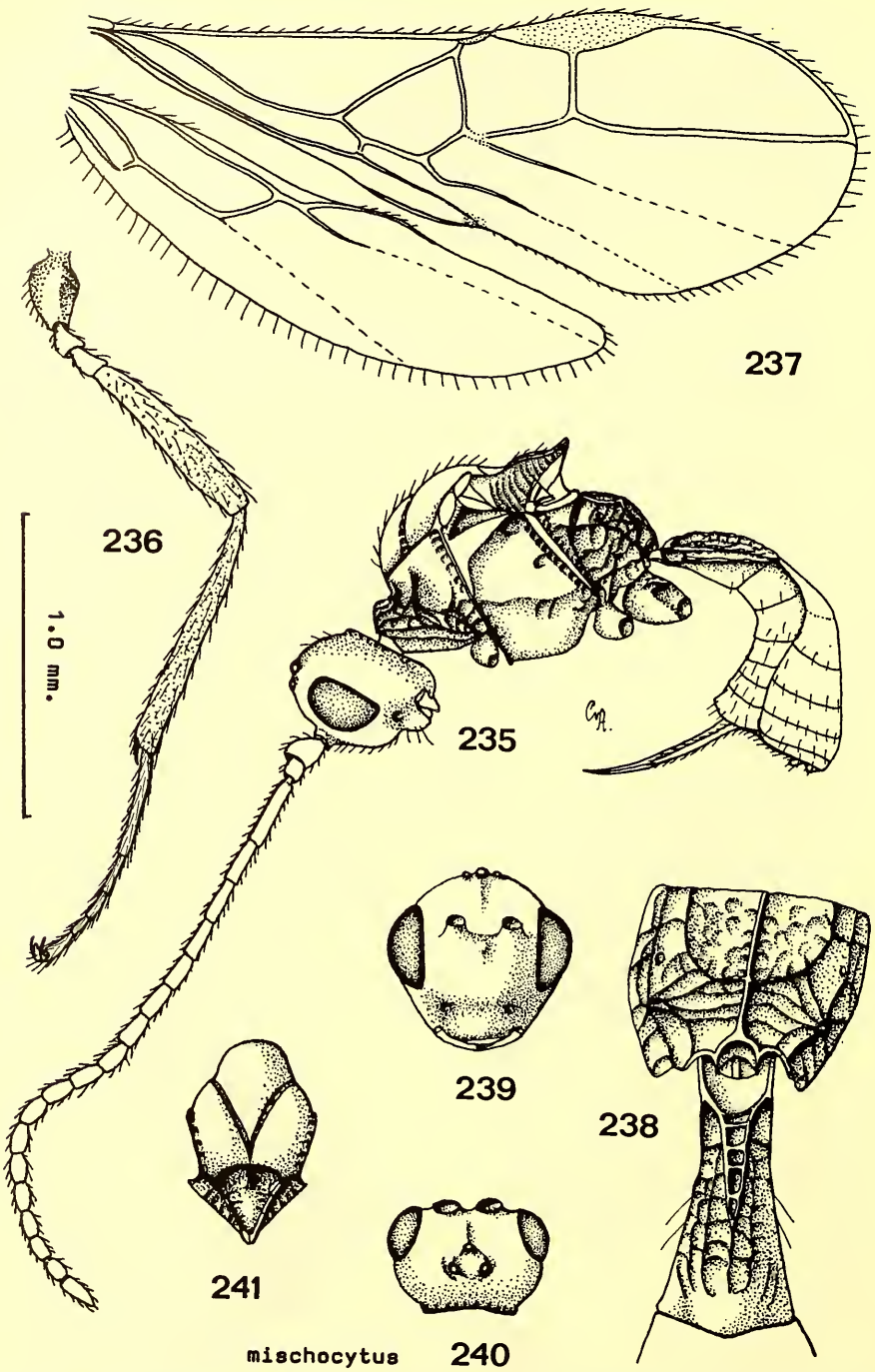

Fig. 235—241, *Blacus* (*Ganychorus*) *mischocytus* spec. nov.; 235—237, 239, holotype; 238, 240, 241, paratype. 235, habitus, lateral aspect; 236, hind leg, lateral aspect; 237, wings; 238, propodeum and 1st tergite, dorsal aspect; 239, head, frontal aspect; 240, head, dorsal aspect; 241, mesonotum, dorsal aspect. 235—237: scale-line; 238: 2.5 × scale-line; 239—241, 1.2 × scale-line

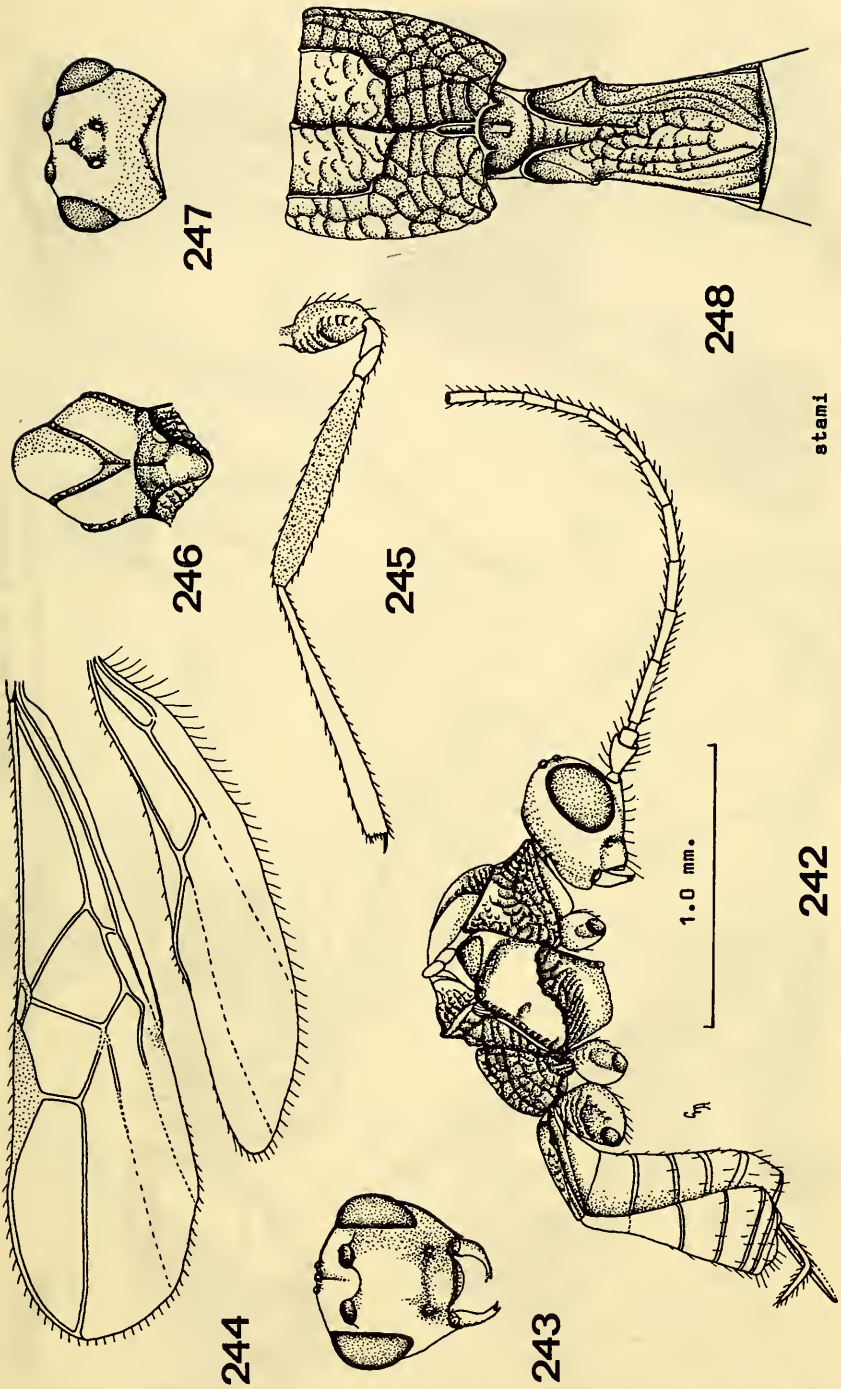

Fig. 242—248, *Blacus* (*Ganychorus*) *stami* spec. nov., holotype. 242, habitus, lateral aspect; 243, head, frontal aspect; 244, wings; 245, hind leg, lateral aspect; 246, mesonotum, dorsal aspect; 247, head, dorsal aspect; 248, propodeum and 1st tergite, dorsal aspect. 242, 244, 245: scale-line; 243, 246, 247: 1.2 × scale-line; 248: 2.5 × scale-line

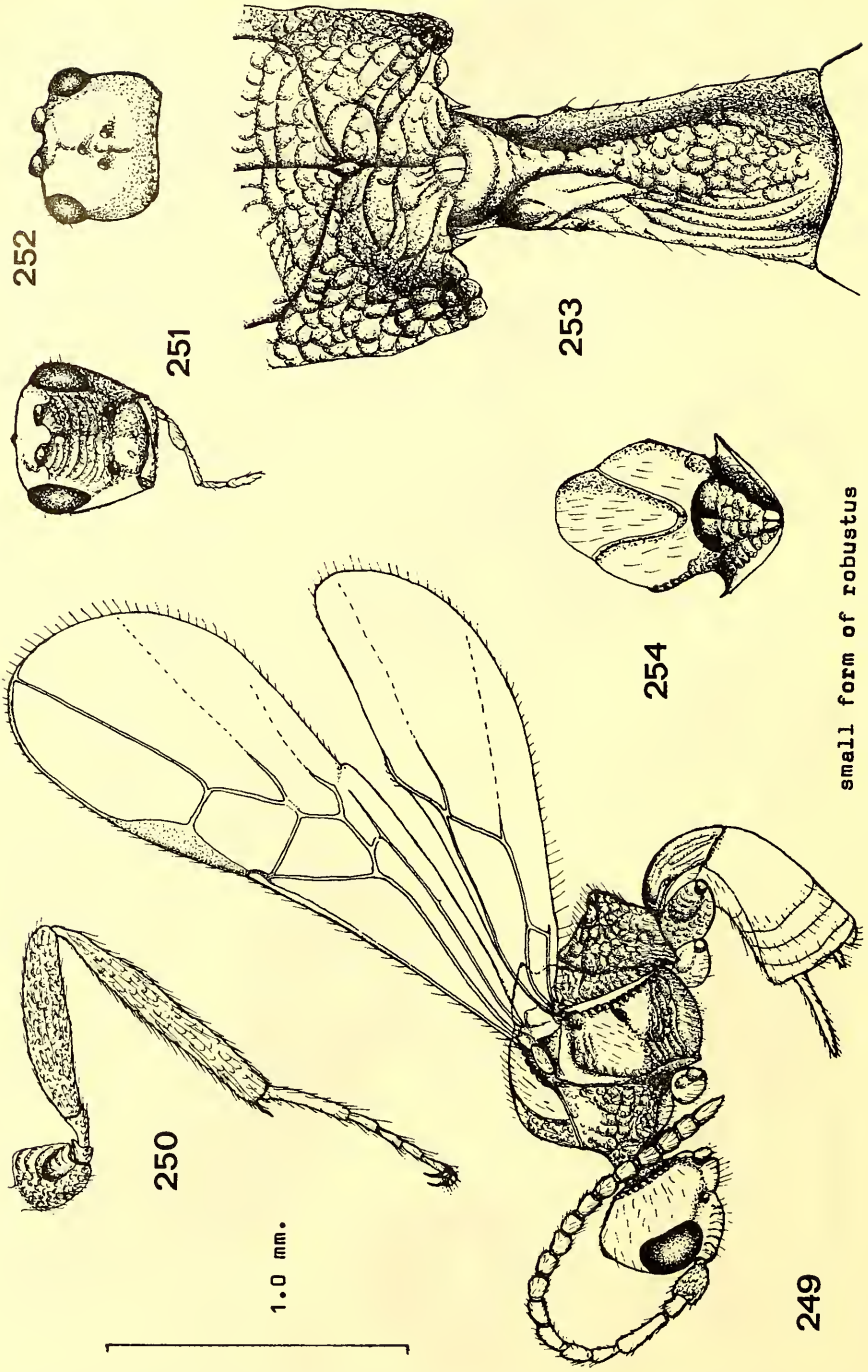

Fig. 249—254, *Blacus* (*Hysterobolus*) *robustus* Haeselbarth, Clingman's Dome (North Carolina). 249, habitus, lateral aspect; 250, hind leg, lateral aspect; 251, head, frontal aspect; 252, head, dorsal aspect; 253, propodeum and 1st tergite, dorsal aspect; 254, mesonotum, dorsal aspect. 249, 250: scale-line; 251, 252, 254: 1.2 × scale-line; 253: 3.0 × scale-line

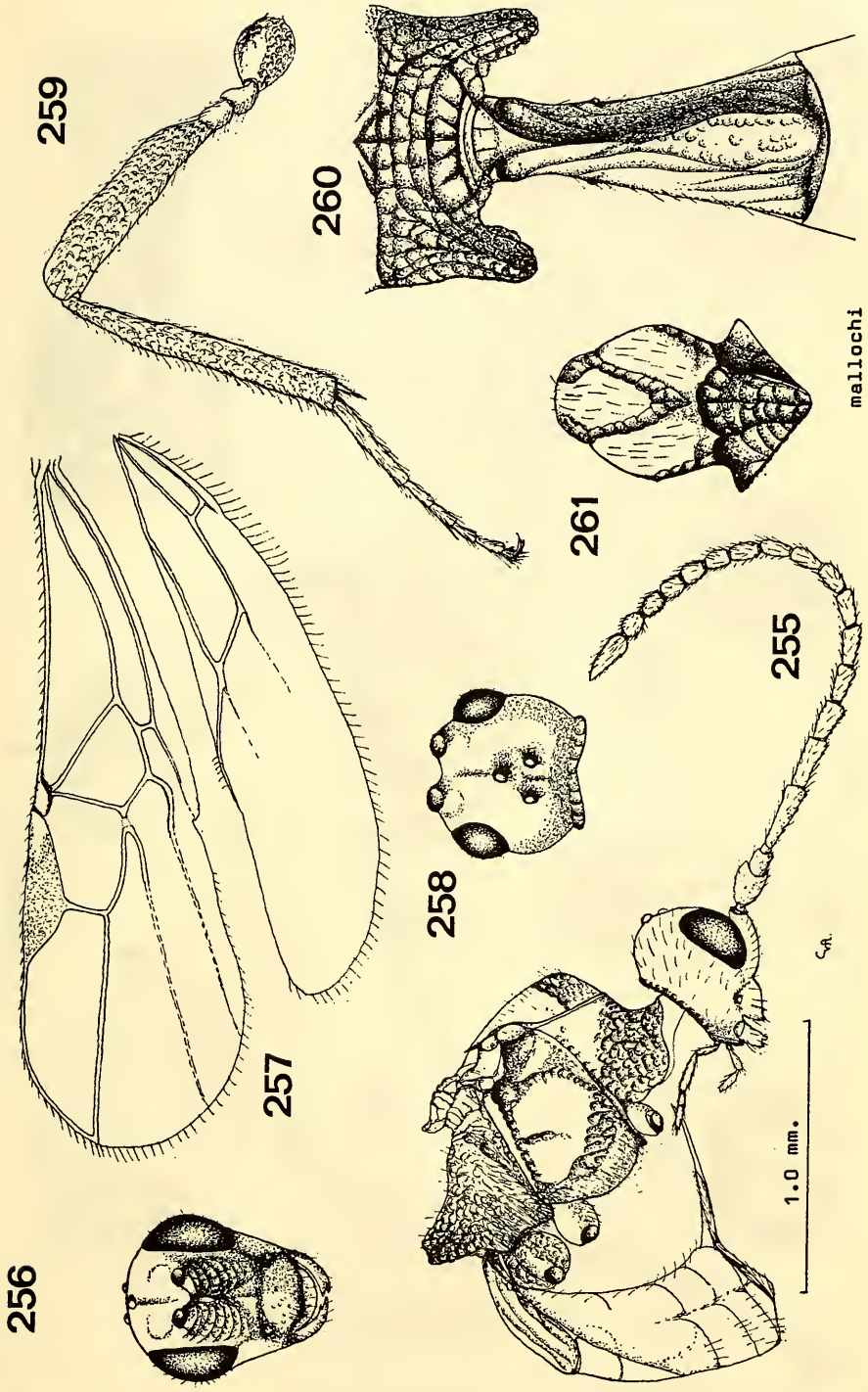

Fig. 255—261, *Blacus* (*Hysterobolus*) *mallochi* (Viereck), holotype. 255, habitus, lateral aspect; 256, head, frontal aspect; 257, wings; 258, head, dorsal aspect; 259, hind leg, lateral aspect; 260, propodeum (p.p.) and 1st tergite, dorsal aspect; 261, mesonotum, dorsal aspect. 255, 257, 259: scale-line; 256, 258, 261: 1.2 × scale-line; 260: 2.5 × scale-line

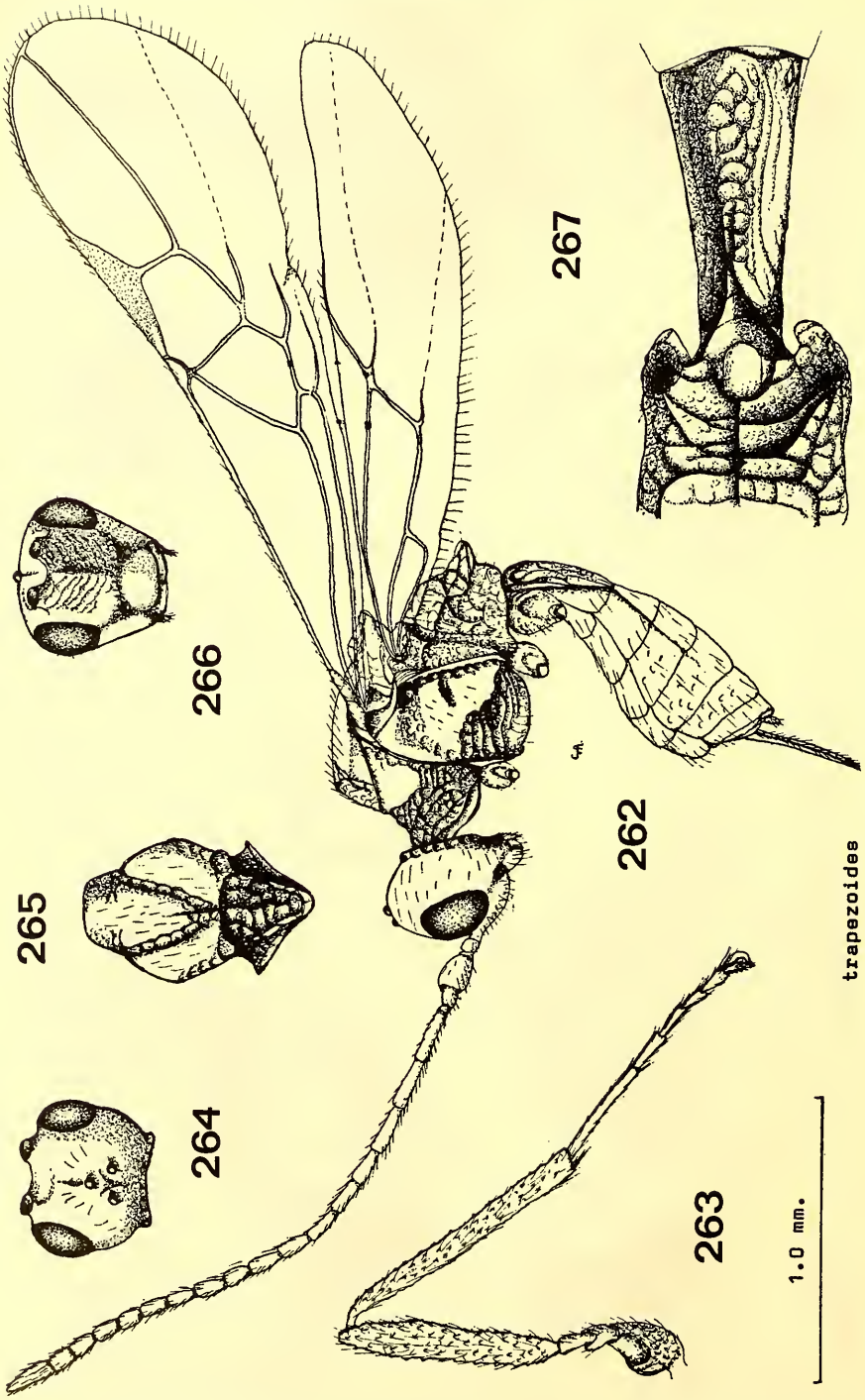

Fig. 262—267, *Blacus* (*Hysterobolus*) *trapezoides* spec. nov., holotype. 262, habitus, lateral aspect; 263, hind leg, lateral aspect; 264, head, dorsal aspect; 265, mesonotum, dorsal aspect; 266, head, frontal aspect; 267, propodeum and 1st tergite, dorsal aspect. 262, 263: scale-line; 264—266: 1.2 × scale-line; 267: 2.5 × scale-line

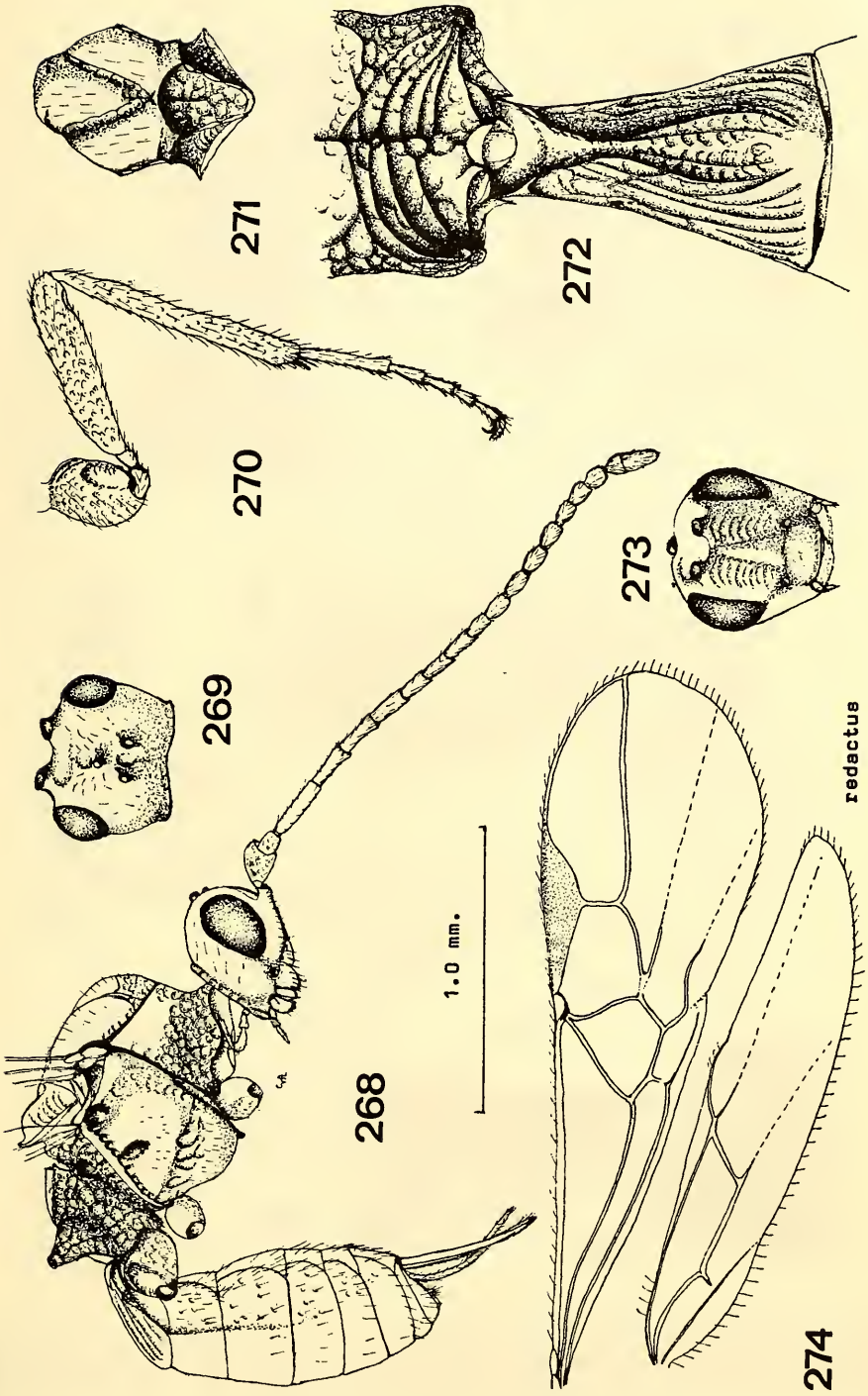

Fig. 268-274, *Blacus* (*Hysterobolus*) *redactus* spec. nov., holotype. 268, habitus, lateral aspect; 269, head, dorsal aspect; 270, hind leg, lateral aspect; 271, mesonotum, dorsal aspect; 272, propodeum adn 1st tergite, dorsal aspect; 273, head, frontal aspect; 274, wings. 268, 270, 274: scale-line; 269, 271, 273: 1.2 × scale-line; 272: 2.5 × scale-line

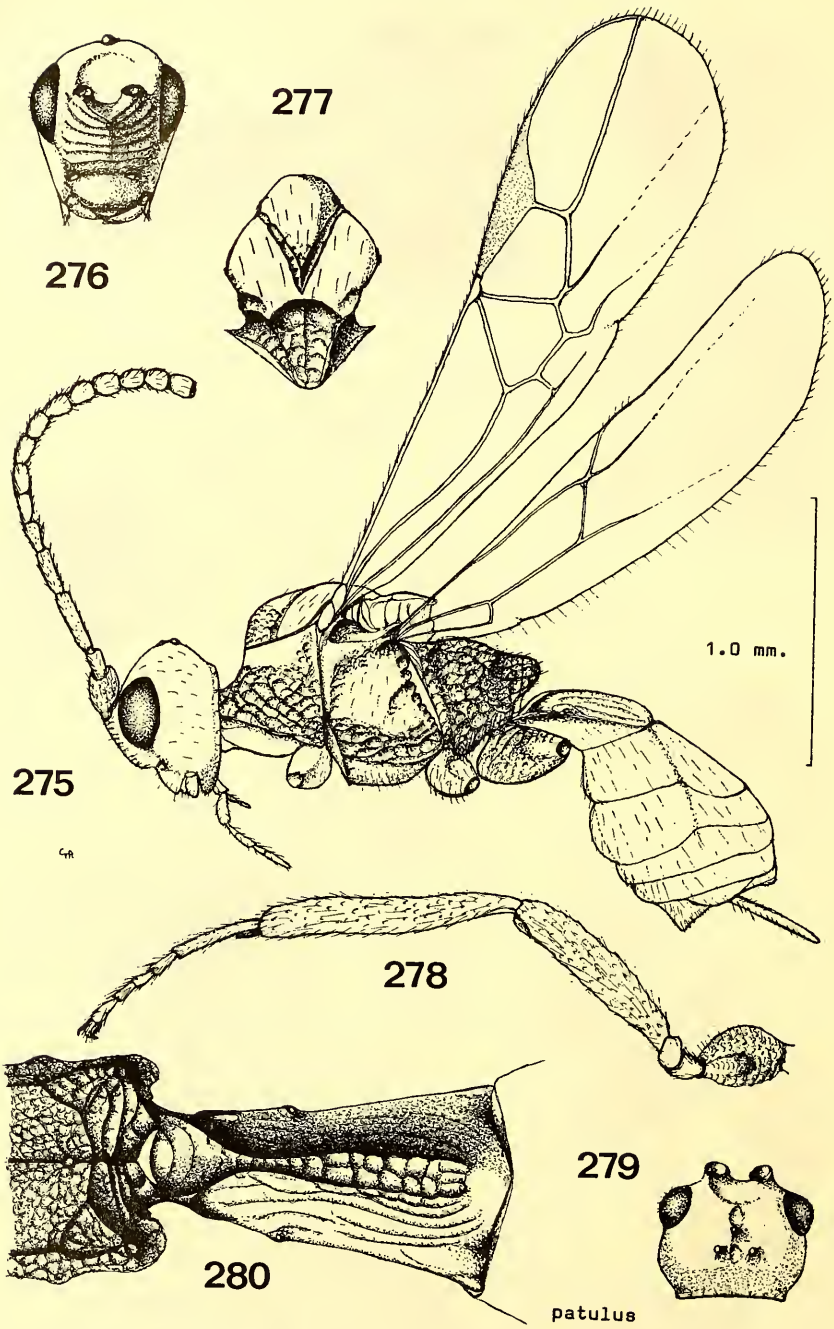

Fig. 275—280, *Blacus* (*Hysterobolus*) *patulus* spec. nov., holotype. 275, habitus, lateral aspect; 276, head, frontal aspect; 277, mesonotum, dorsal aspect; 278, hind leg, lateral aspect; 279, head, dorsal aspect; 280, propodeum and 1st tergite, dorsal aspect. 275, 278: scale-line; 276, 277, 279: 1.2 × scale-line; 280: 2.5 × scale-line

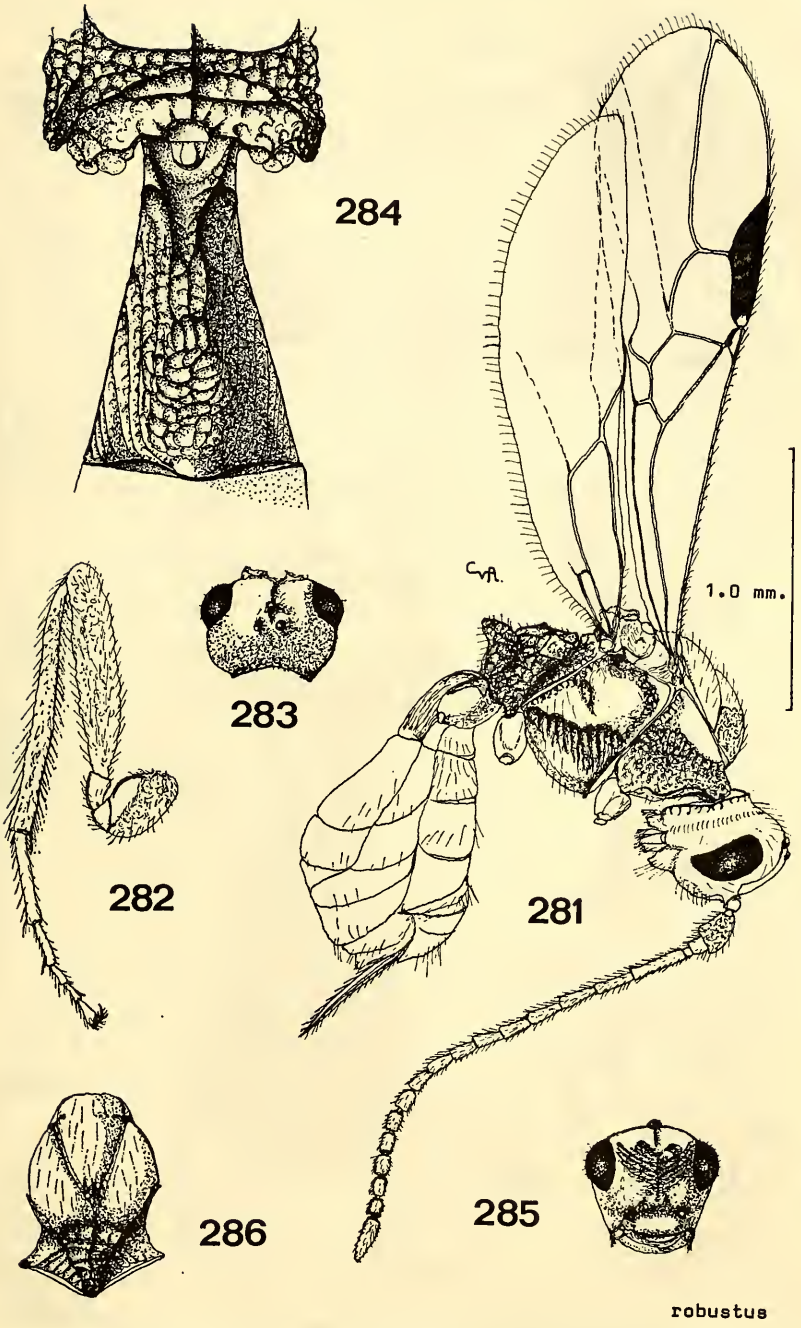

Fig. 281—286, *Blacus* (*Hysterobolus*) *robustus* Haeselbarth, Rustlers Park (Arizona). 281, habitus, lateral aspect; 282, hind leg, lateral aspect; 283, head, dorsal aspect; 284, propodeum (p.p.) and 1st tergite, dorsal aspect; 285, head, frontal aspect; 286, mesonotum, dorsal aspect. 281—283, 285—286: scale-line; 284: 2.5 × scale-line

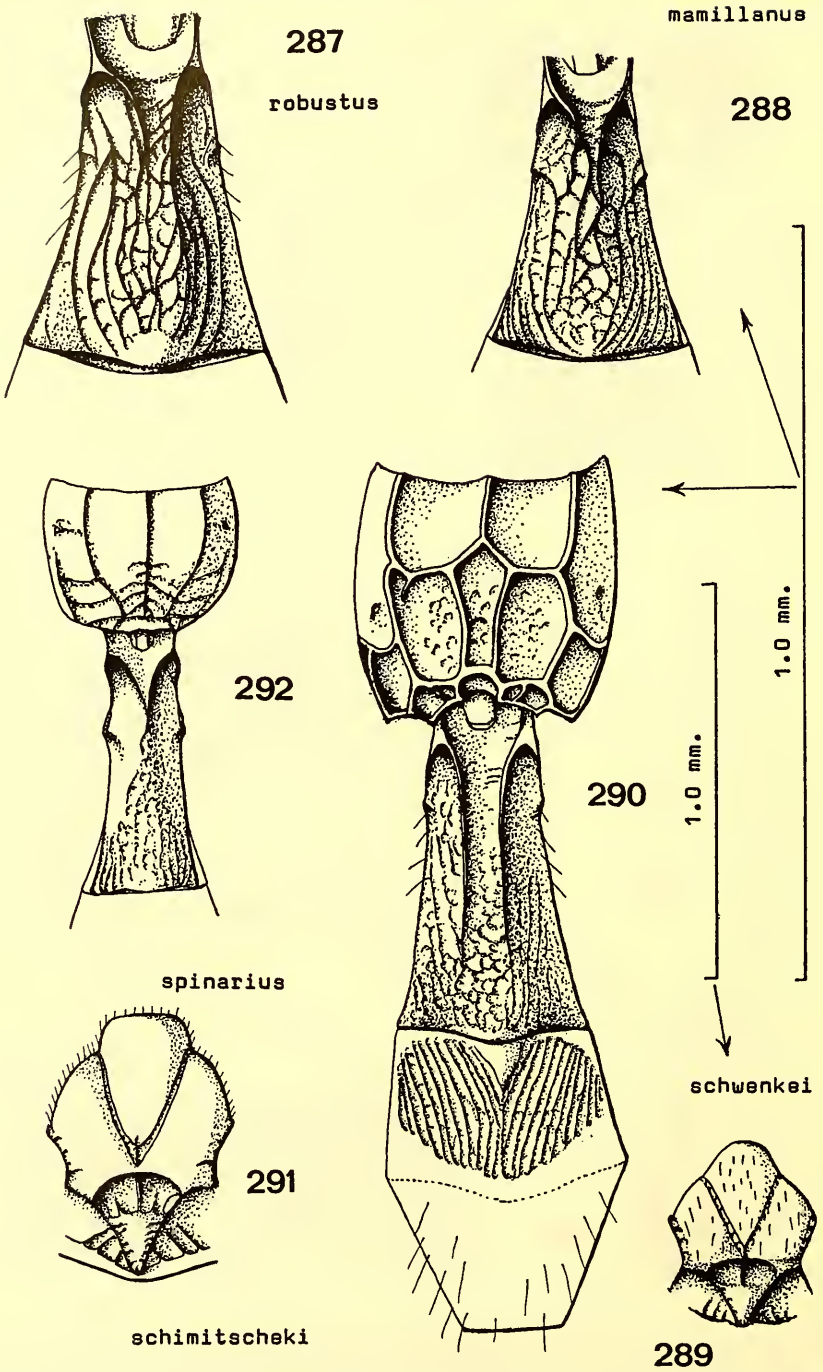

Fig. 287—292. 287, *Blacus* (*Hysterobolus*) *robustus* Haeselbarth, ♀, paratype, 1st tergite, dorsal aspect; 288, *Blacus* (*H.*) *mamillanus* Ruthe, ♀, Fürstenberg i. M. (Germany), 1st tergite, dorsal aspect; 289, 290, *Blacus* (*Tarpheion*) *schwenkei* Haeselbarth, ♀, paratype; 289, mesonotum, dorsal aspect; 290, propodeum, 1st-3rd tergites; 291, *Blacus* (*T.*) *schimitscheki* Haeselbarth, ♀, paratype, mesonotum, dorsal aspect; 292, *Artocrus spinarius* spec. nov., holotype, propodeum and 1st tergite, dorsal aspect. 287, 288, 290: long scale-line; 289, 291, 292: short scale-line

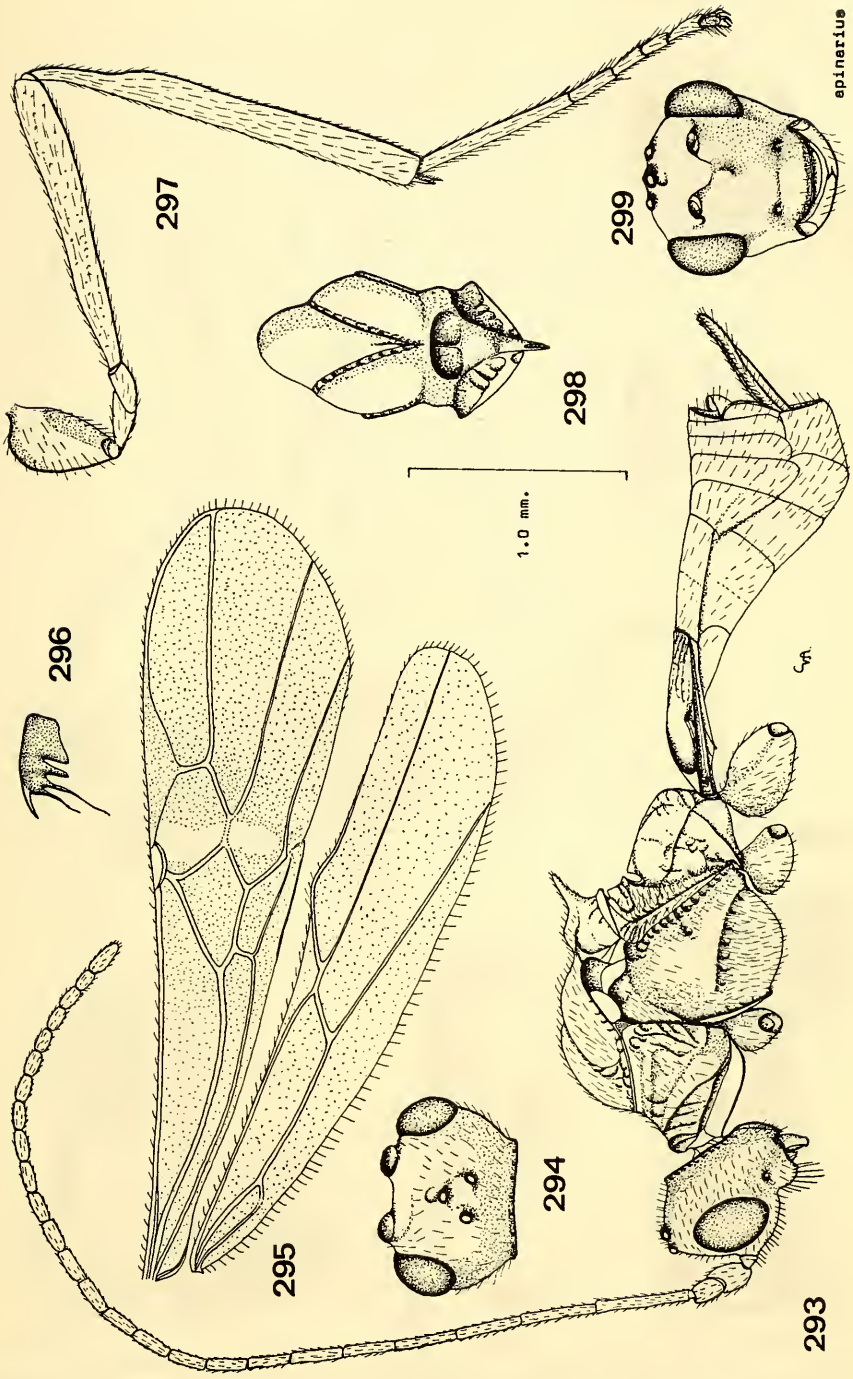

Fig. 293—299, *Artocrus spinarius* spec. nov., holotype. 293, habitus, lateral aspect; 294, head, dorsal aspect; 295, wings; 296, fore tarsal claw, lateral aspect; 297, hind leg, lateral aspect; 298, mesonotum, dorsal aspect; 299, head, frontal aspect. 293, 295, 297: scale-line; 294, 298, 299: 1.2 × scale-line; 296: 5.0 × scale-line

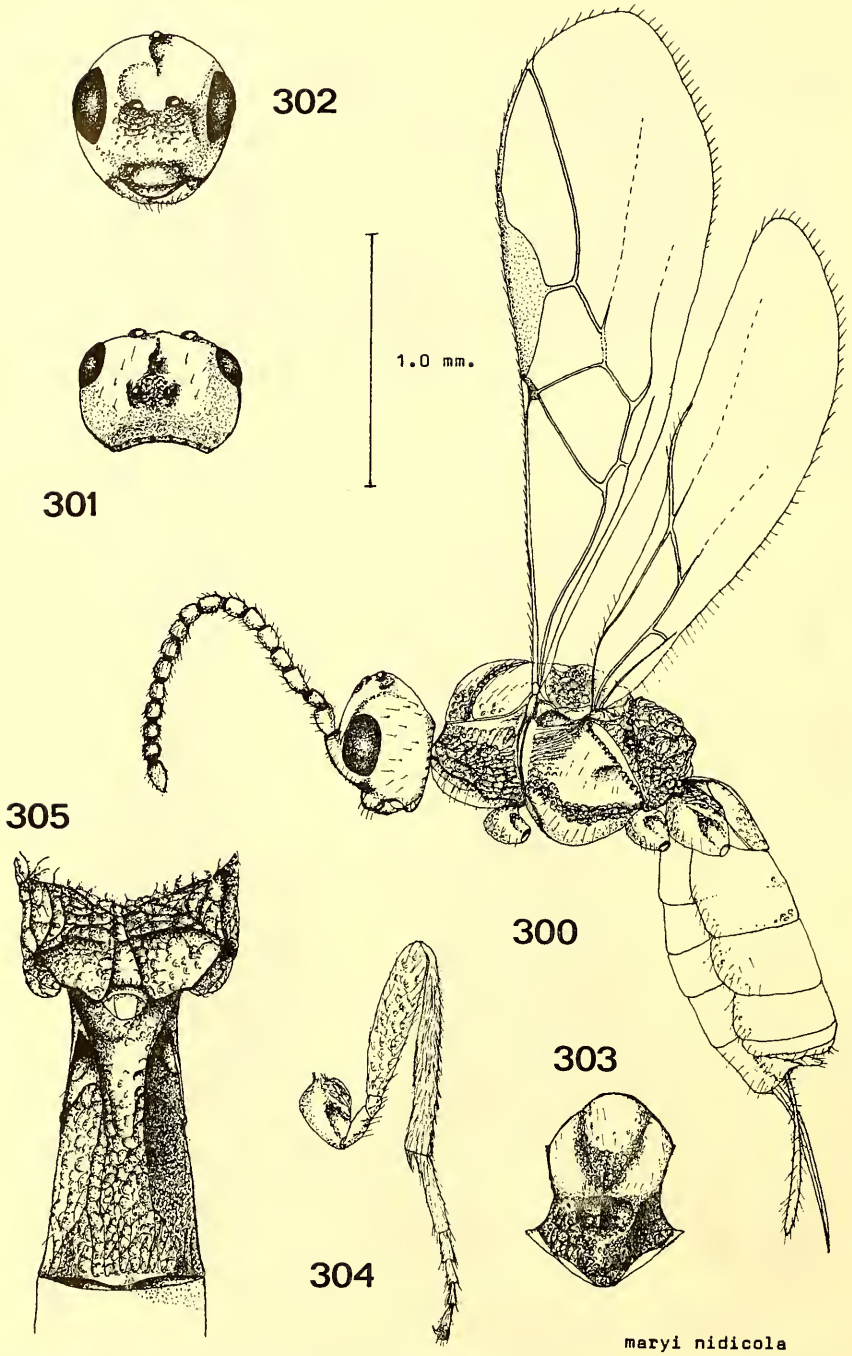

Fig. 300—305, *Blacus* (*Blacus*) *maryi* f. *nidicola* Hedqvist, Yukon Territory (Canada). 300, habitus, lateral aspect; 301, head, dorsal aspect; 302, head, frontal aspect; 303, mesonotum, dorsal aspect; 304, hind leg, lateral aspect; 305, propodeum (p.p.) and 1st tergite, dorsal aspect. 300, 304: scale-line; 301—303: 1.2 × scale-line; 305: 2.5 × scale-line

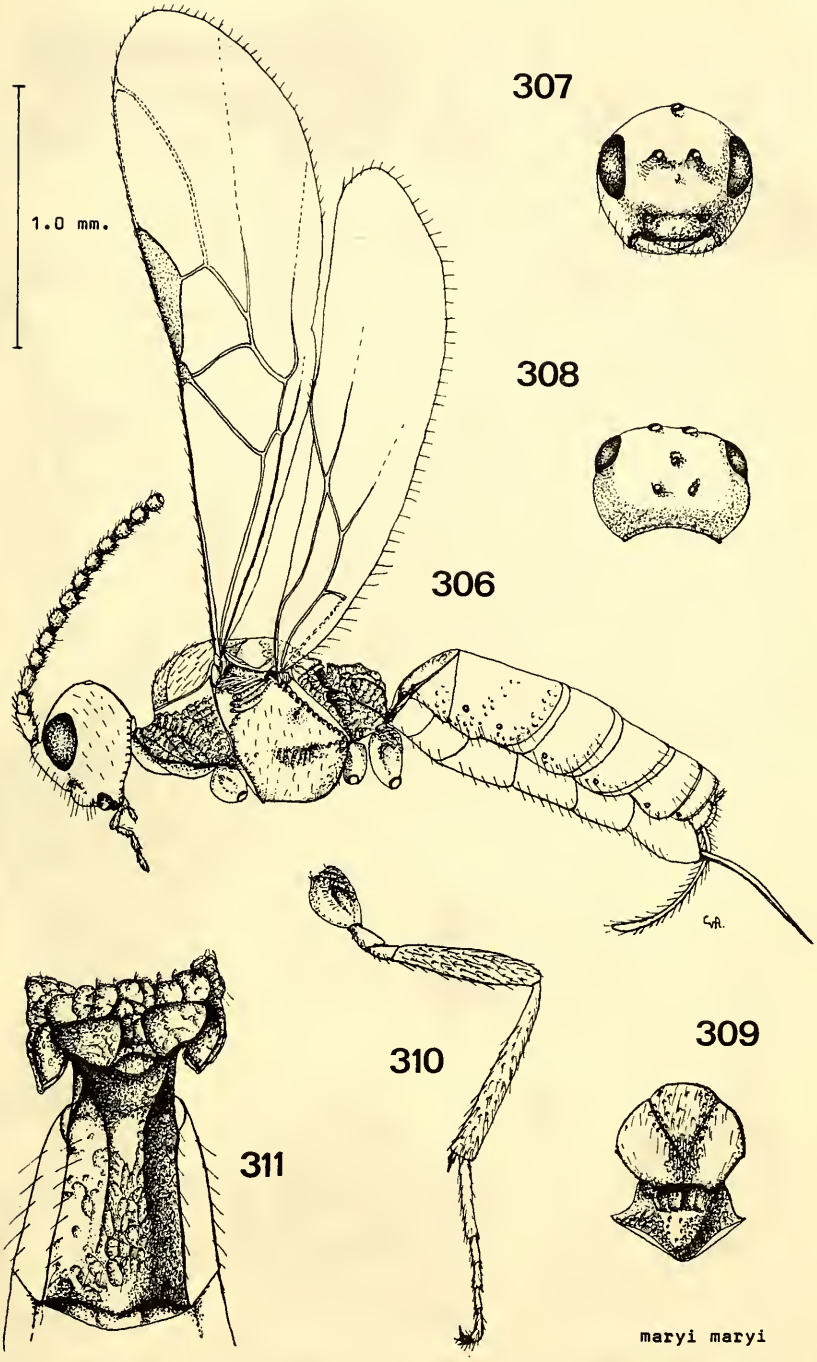

Fig. 306—311, *Blacus* (*Blacus*) *maryi* Hellén, Pete Lake (British Columbia). 306, habitus, lateral aspect; 307, head, frontal aspect; 308, head, dorsal aspect; 309, mesonotum, dorsal aspect; 310, hind leg, lateral aspect; 311, propodeum (p.p.) and 1st tergite, dorsal aspect. 306, 310: scale-line; 307—309: 1.2 × scale-line; 311: 2.5 × scale-line

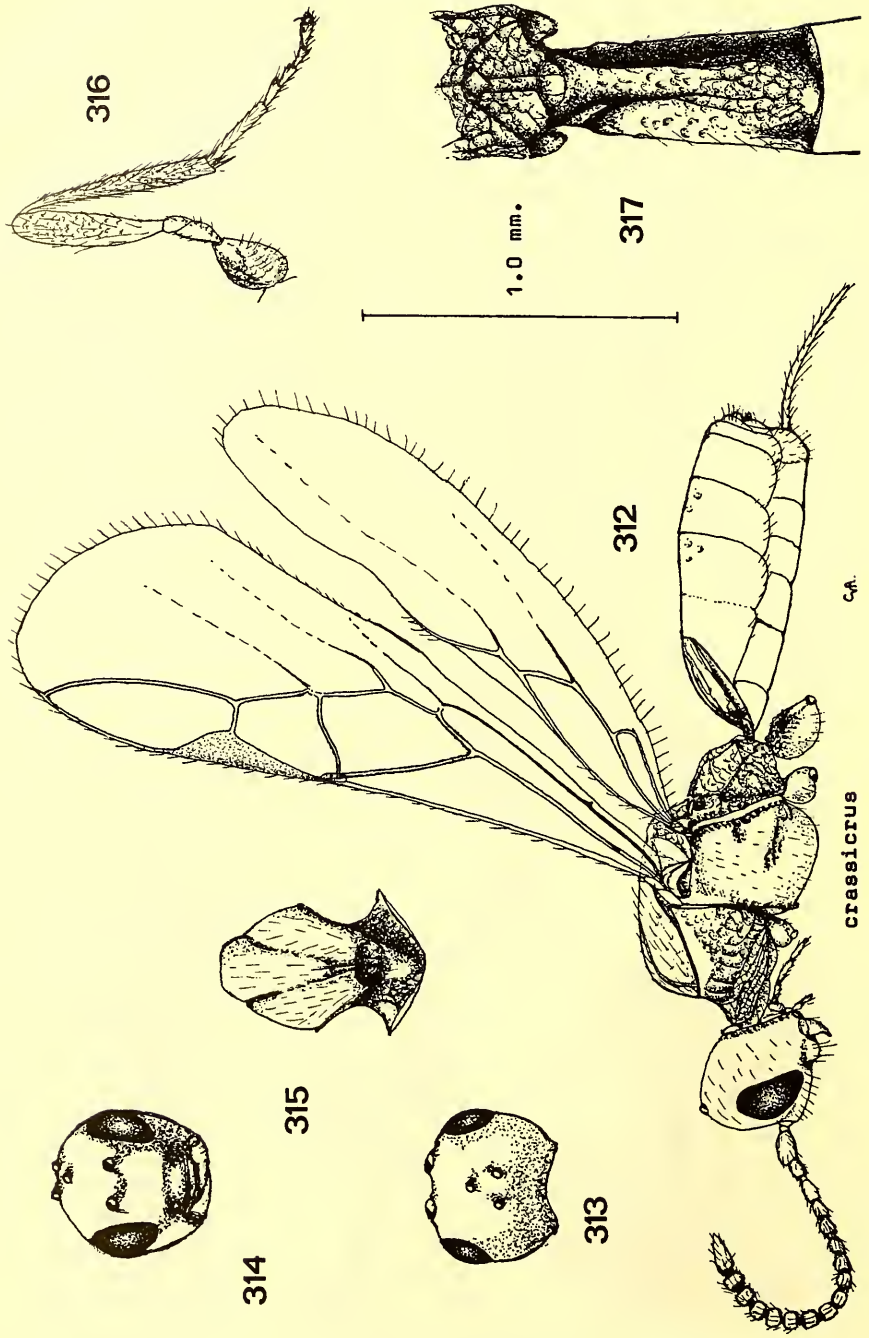

Fig. 312—317, *Blacus* (*Blacus*) *crassicrus* spec. nov., holotype. 312, habitus, lateral aspect; 313, head, dorsal aspect; 314, head, frontal aspect; 315, mesonotum, dorsal aspect; 316, hind leg, lateral aspect; 317, propodeum and 1st tergite, dorsal aspect. 312, 316: scale-line; 313—315: 1.2 × scale-line; 317: 2.5 × scale-line

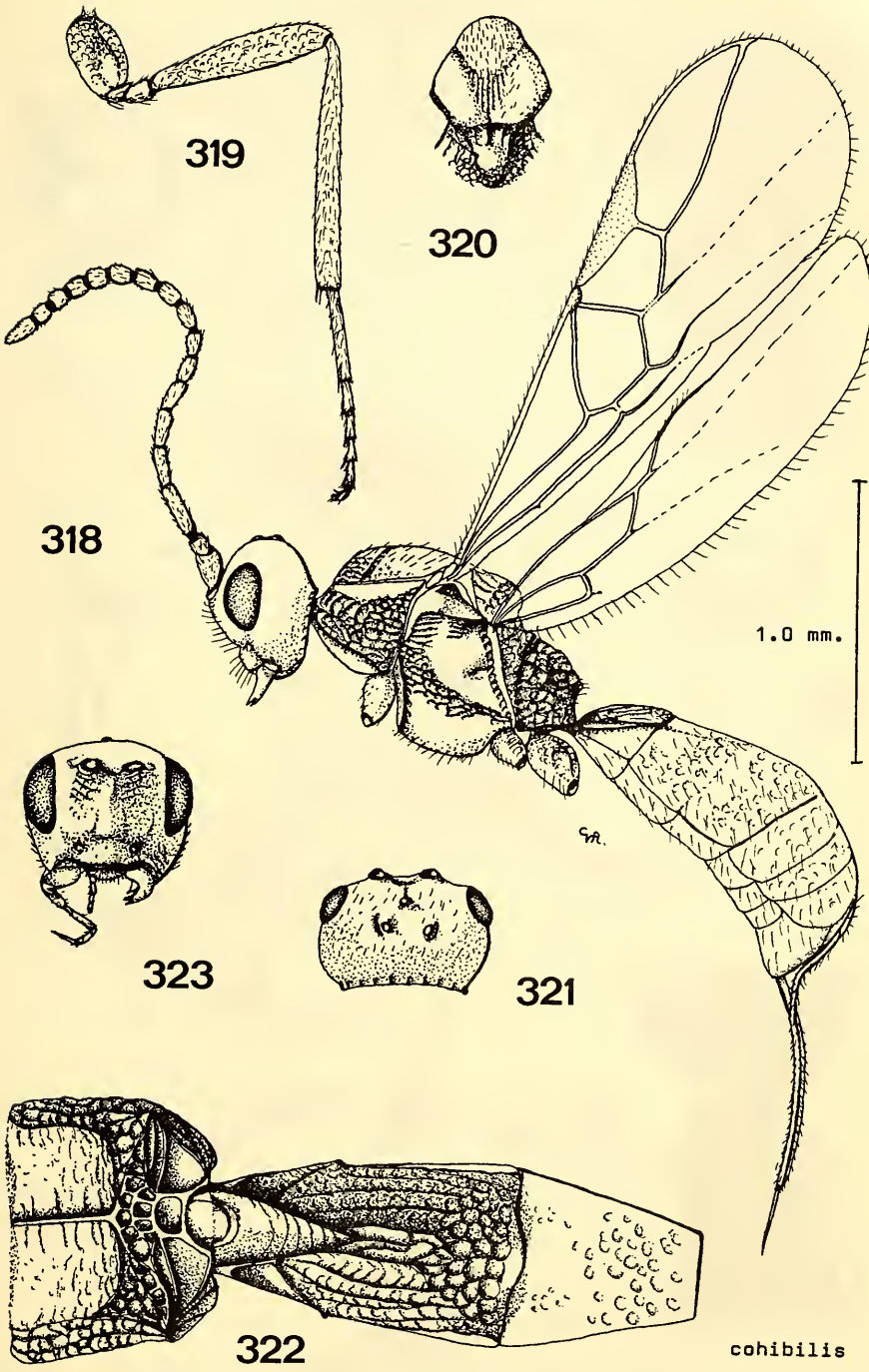

Fig. 318—323, *Blacus* (*Blacus*) *cohibilis* spec. nov., holotype. 318, habitus, lateral aspect; 319, hind leg, lateral aspect; 320, mesonotum, dorsal aspect; 321, head, dorsal aspect; 322, propodeum, 1st and 2nd tergites, dorsal aspect; 323, head, frontal aspect. 318—321, 323: scale-line: 322: 2.5 × scale-line

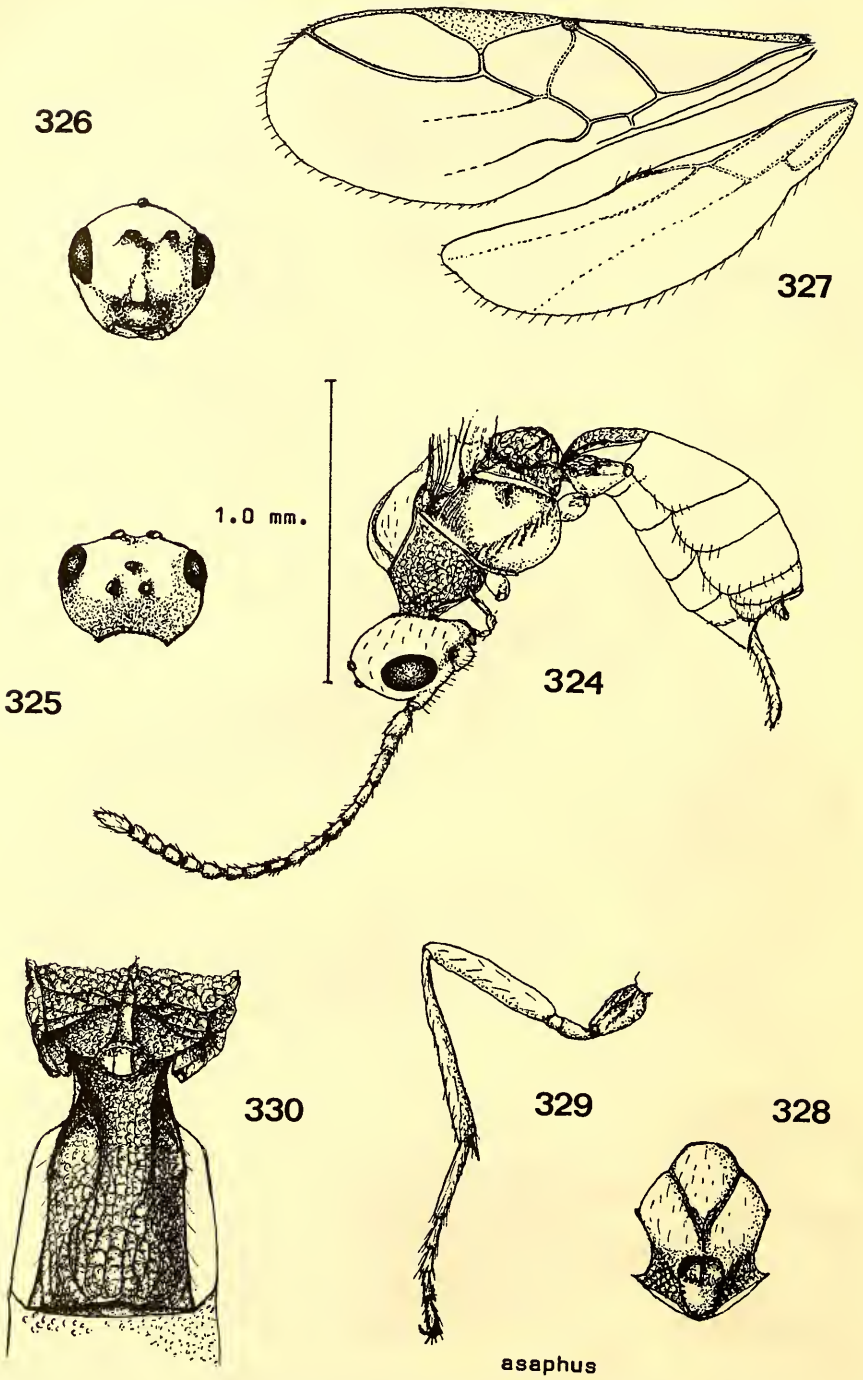

Fig. 324—330, *Blacus* (*Blacus*) *asaphus* spec. nov., holotype. 324, habitus, lateral aspect; 325, head, dorsal aspect; 327, wings; 328, mesonotum, dorsal aspect; 329, hind leg, lateral aspect; 330, propodeum (p.p.) and 1st tergite, dorsal aspect. 324, 327, 329: scale-line; 325, 326, 328: 1.2 × scale-line; 330: 2.5 × scale-line

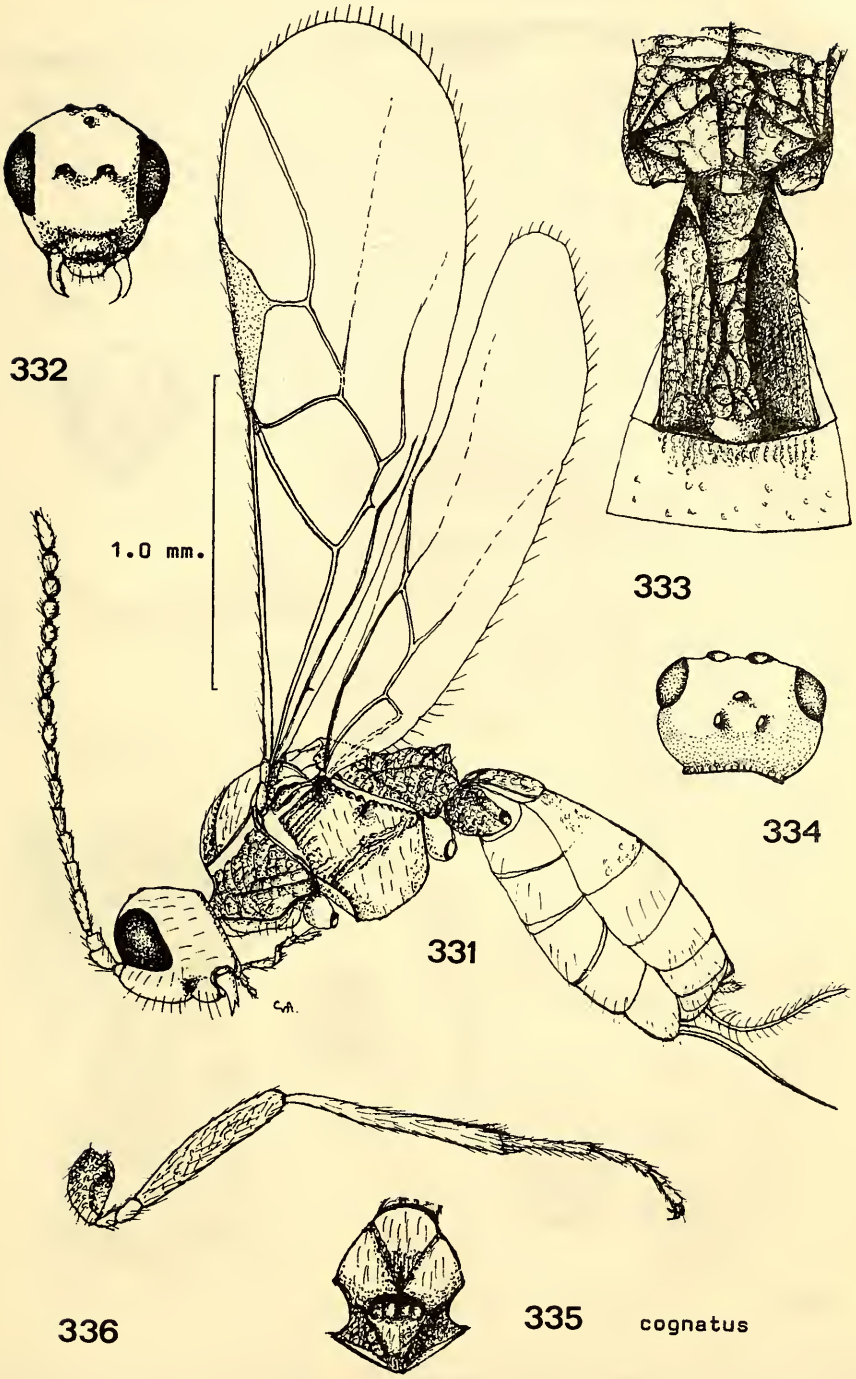

Fig. 331—336, *Blacus* (*Blacus*) *cognatus* spec. nov., holotype. 331, habitus, lateral aspect; 332, head, frontal aspect; 333, propodeum (p.p.), 1st and 2nd tergites, dorsal aspect; 334, head, dorsal aspect; 335, mesonotum, dorsal aspect; 336, hind leg, lateral aspect. 331, 336: scale-line; 332, 334, 335: 1.2 × scale-line; 333: 2.5 × scale-line

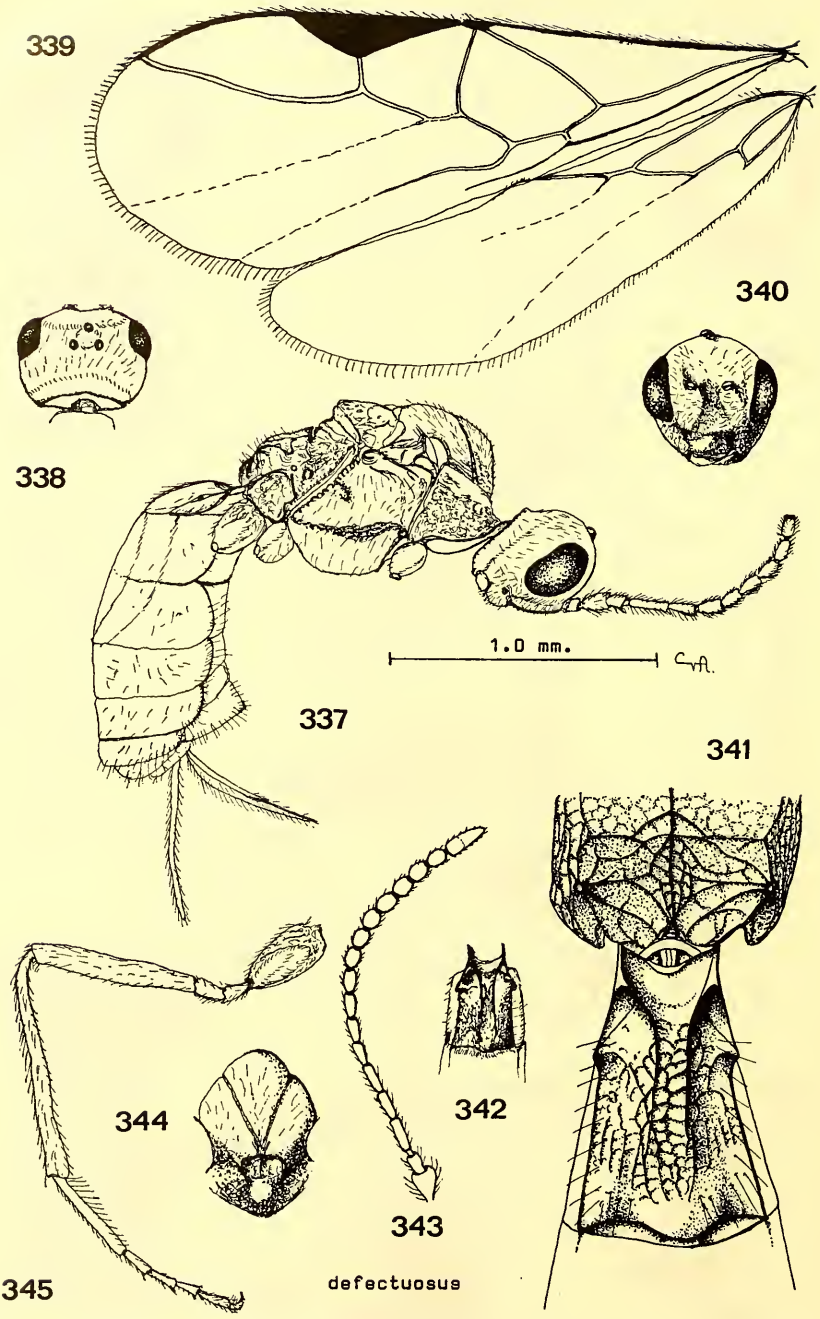

Fig. 337—345, *Blacus* (*Blacus*) *defectuosus* Provancher; 337—340, 342, 344, 345, holotype; 341, 343 after females from Sasketoon (Saskatchewan). 337, habitus, lateral aspect; 338, head, dorsal aspect; 339, wings; 340, head, frontal aspect; 341, propodeum and 1st tergite, dorsal aspect; 342, 1st tergite, dorsal aspect; 343, antenna, lateral aspect; 344, mesonotum, dorsal aspect; 345, hind leg, lateral aspect. 337—340, 342—345: scale-line; 341: 2.5 × scale-line

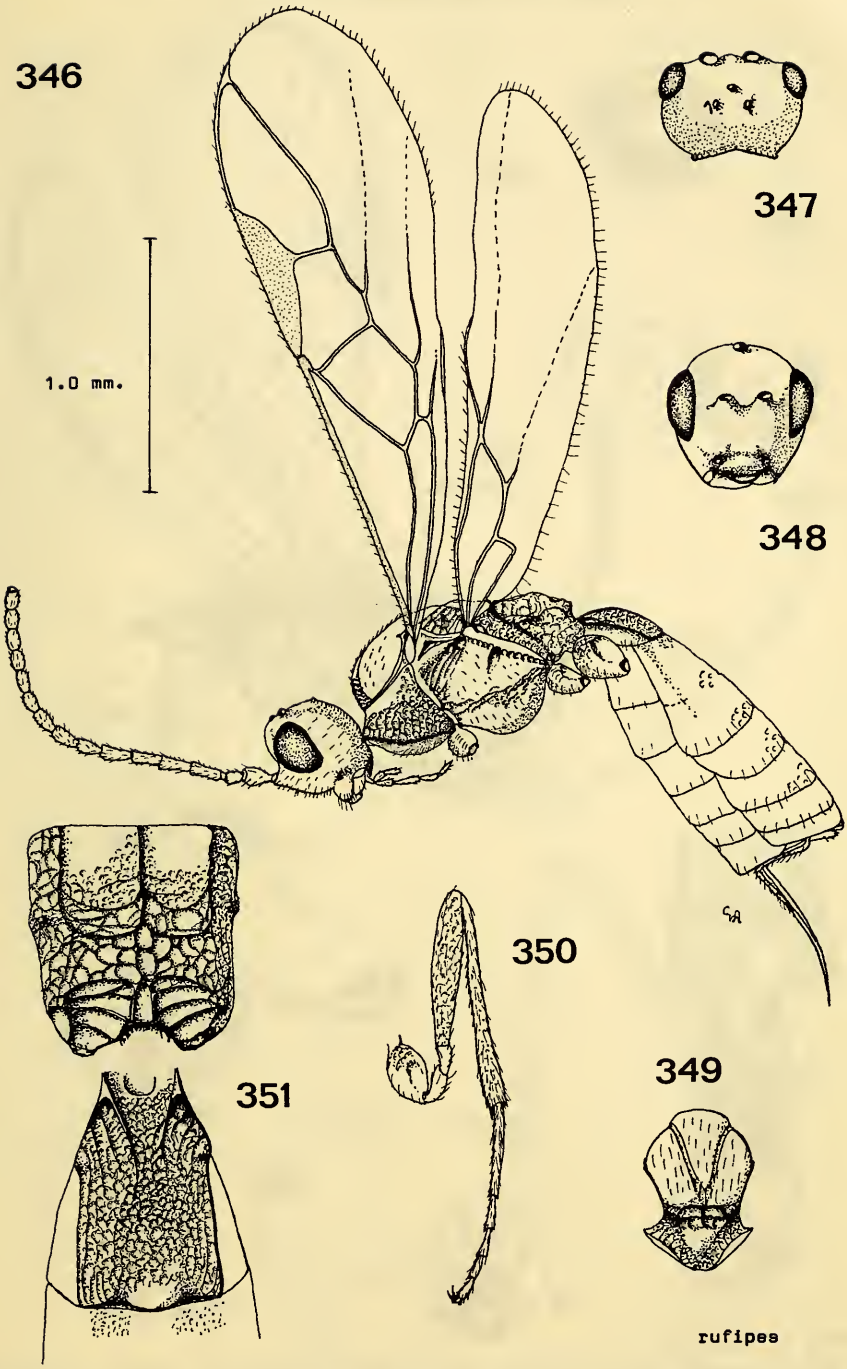

Fig. 346—351, *Blacus* (*Blacus*) *rufipes* (Ashmead), Swift Current (Saskatchewan). 346, habitus, lateral aspect; 347, head, dorsal aspect; 348, head, frontal aspect; 349, mesonotum, dorsal aspect; 350, hind leg, lateral aspect; 351, propodeum and 1st tergite, dorsal aspect. 346, 350: scale-line; 347—349: 1.2 × scale-line; 351: 2.5 × scale-line

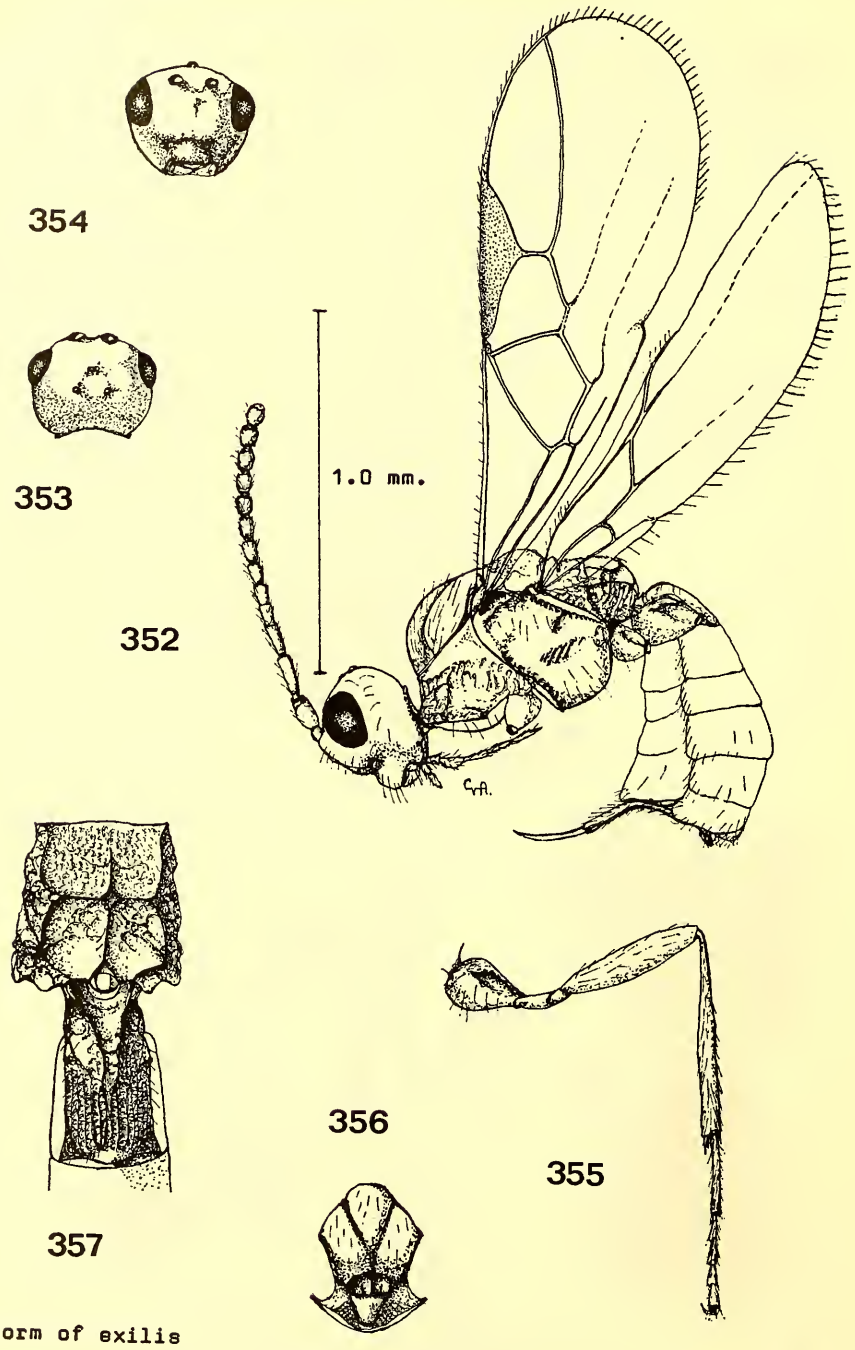

Fig. 352—357, *Blacus* (*Blacus*) *exilis* (Nees), Payne Bay (Quebec). 352, habitus, lateral aspect; 353, head, dorsal aspect; 354, head, frontal aspect; 355, hind leg, lateral aspect; 356, mesonotum, dorsal aspect; 357, propodeum and 1st tergite, dorsal aspect. 352—356: scale-line; 357: 2.1 × scale-line

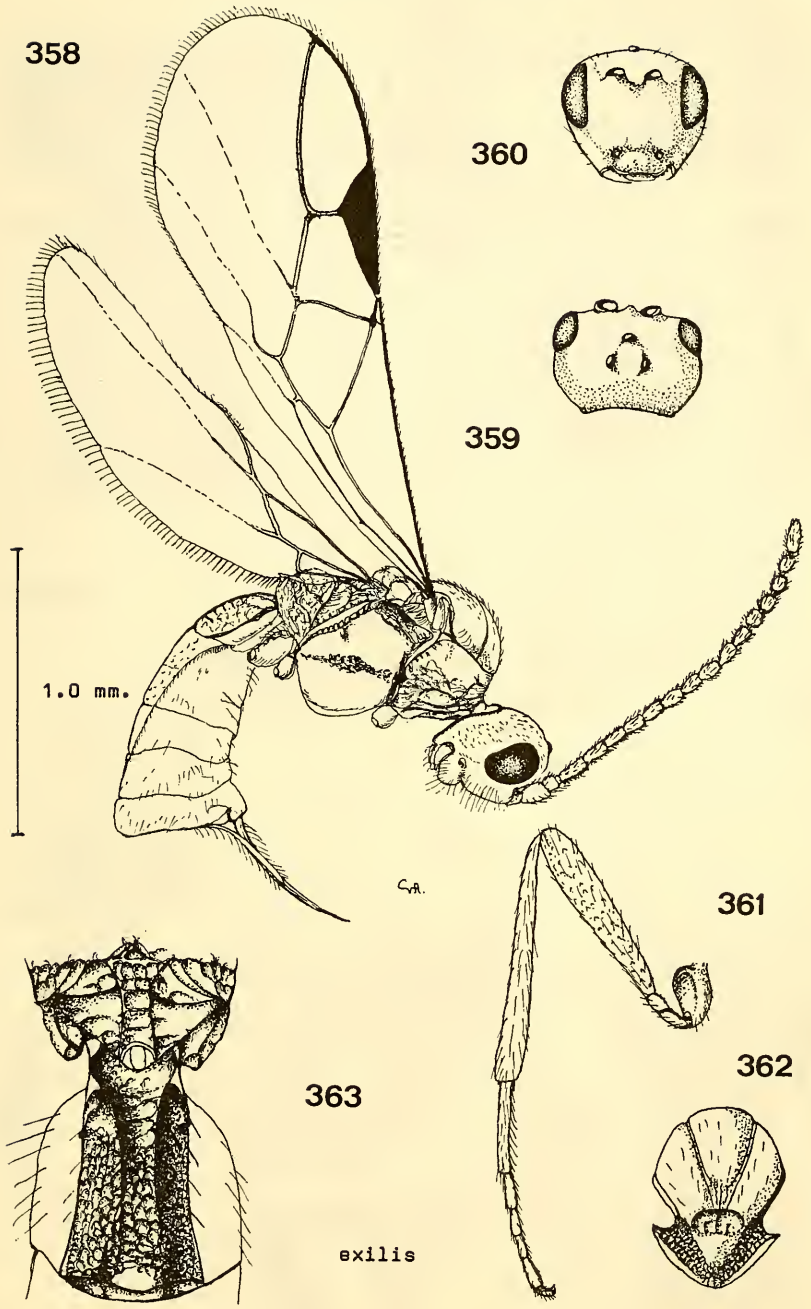

Fig. 358—363, *Blacus* (*Blacus*) *exilis* (Nees), Sioux City (Iowa). 358, habitus, hind leg, lateral aspect; 362, mesonotum, dorsal aspect; 363, propodeum (p.p.) and 1st tergite, dorsal aspect. 358 scale-line; 359—362: 1.2 × scale-line; 363: 2.5 × scale-line

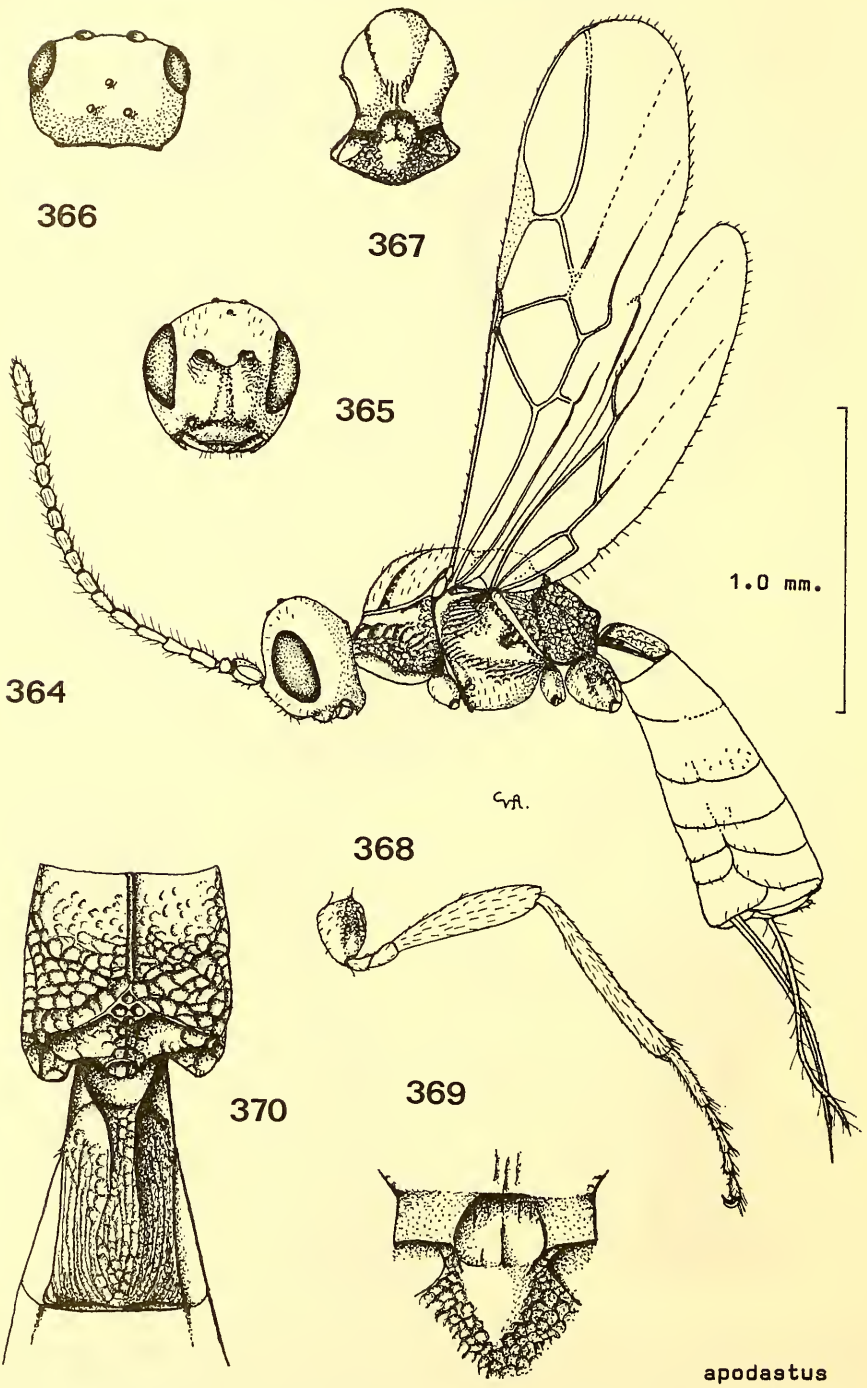

Fig. 364—370, *Blacus* (*Blacus*) *apodastus* spec. nov., holotype. 364, habitus, lateral aspect; 365, head, frontal aspect; 366, head, dorsal aspect; 367, mesonotum, dorsal aspect; 368, hind leg, lateral aspect; 369, detail of scutellum, dorsal aspect; 370, propodeum and 1st tergite, dorsal aspect. 364, 368: scale-line; 365—367: 1.2 × scale-line; 369: 3.0 × scale-line; 370: 2.5 × scale-line

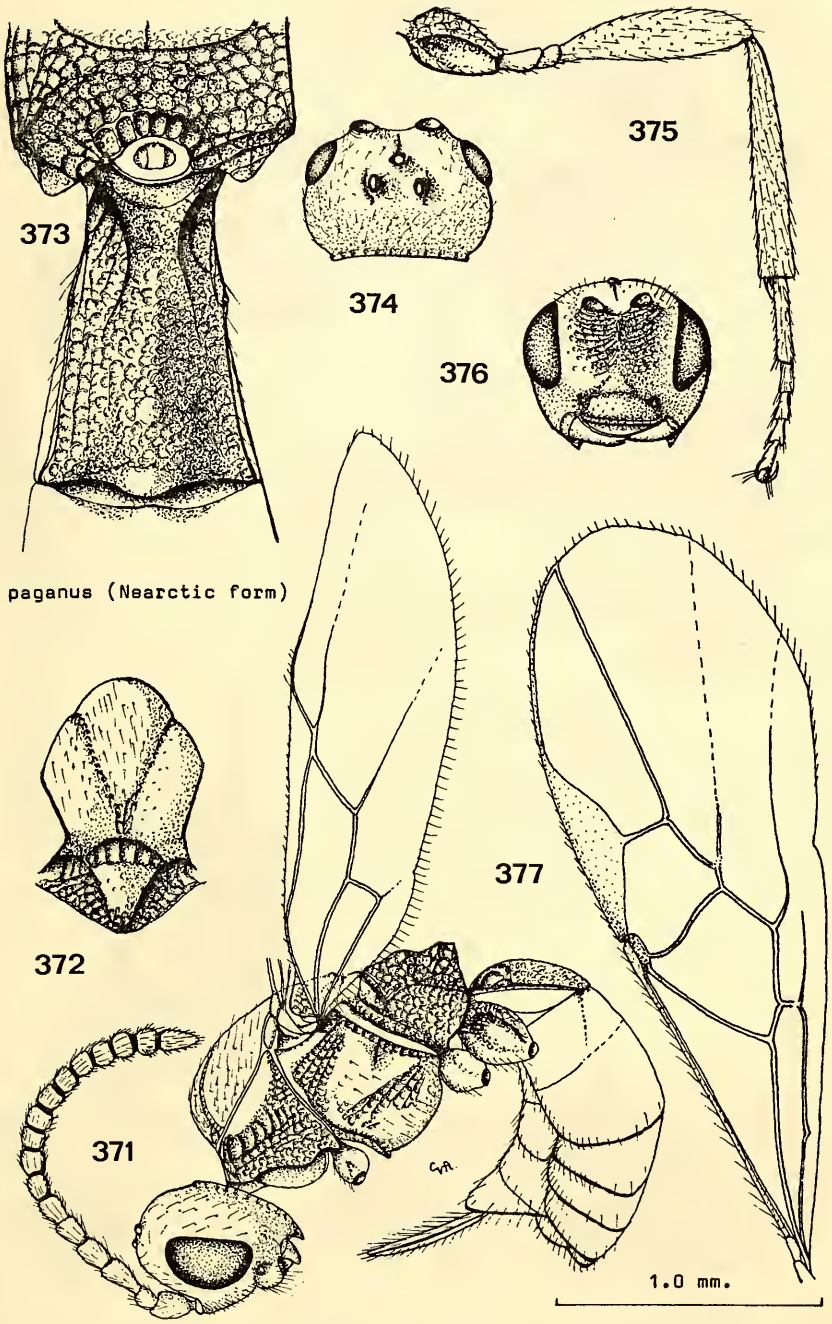

Fig. 371—377, *Blacus* (*Blacus*) *paganus* Haliday, Highlands (North Carolina). 371, habitus, lateral aspect; 372, mesonotum, dorsal aspect; 373, propodeum (p.p.) and 1st tergite, dorsal aspect; 374, head, dorsal aspect; 375, hind leg, lateral aspect; 376, head, frontal aspect; 377, fore wing. 371, 375, 377: scale-line; 372, 374, 376: 1.2 × scale-line; 373: 2.5 × scale-line

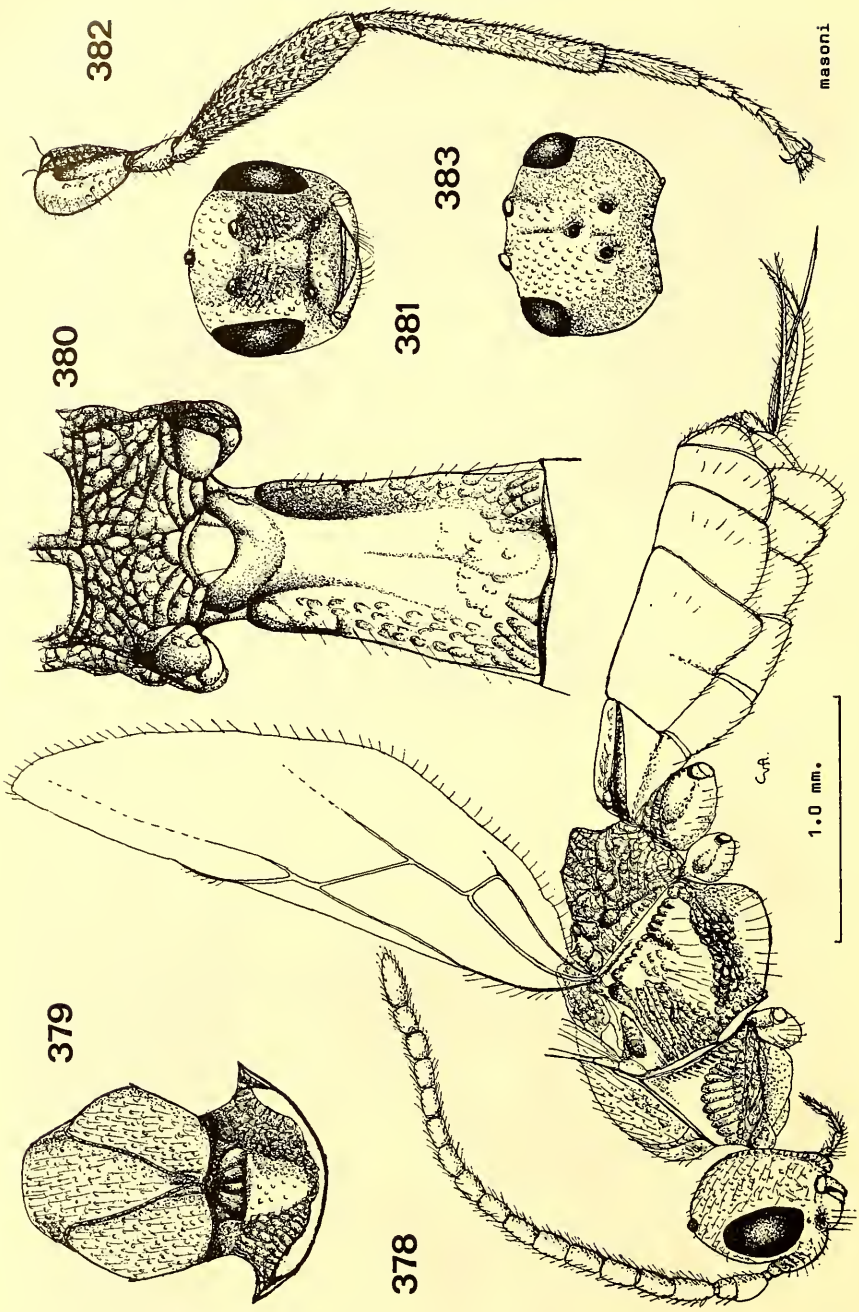

Fig. 378—383, *Blacus* (*Blacus*) *masoni* spec. nov., holotype. 378, habitus, lateral aspect; 379, mesonotum, dorsal aspect; 380, propodeum (p.p.) and 1st tergite; 381, head, frontal aspect; 382, hind leg, lateral aspect; 383, head, dorsal aspect. 378, 382: scale-line; 379, 381, 383: 1.2 × scale-line; 380: 2.5 × scale-line

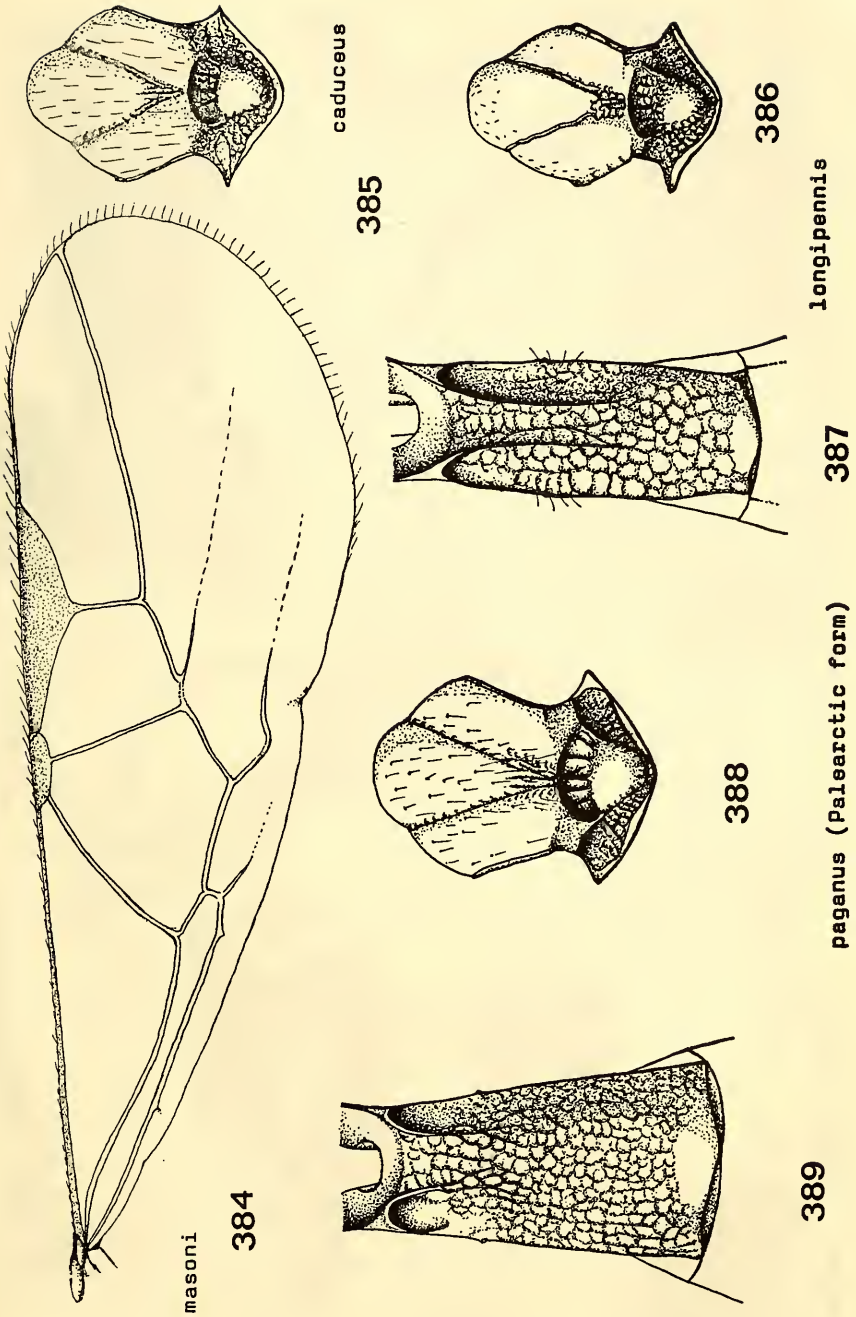

Fig. 384—389. 384, *Blacus* (*Blacus*) *masoni* spec. nov., holotype, fore wing; 385, *Blacus* (*B.*) *caduceus* spec. nov., ♀, partype, mesonotum, dorsal aspect; 386—387, *Blacus* (*B.*) *longipennis* (Gravenhorst), ♀, Waarder (Netherlands); 386, mesonotum, dorsal aspect; 387, 1st tergite, dorsal aspect; 388—389, *Blacus* (*B.*) *paganus* Haliday, ♀, Selva (Norway); 388, mesonotum, dorsal aspect; 389, 1st tergite, dorsal aspect. 384: as scale-line of Fig. 364; 385, 386, 388: 1.2 × this scale-line; 387, 389: 2.5 × this scale-line

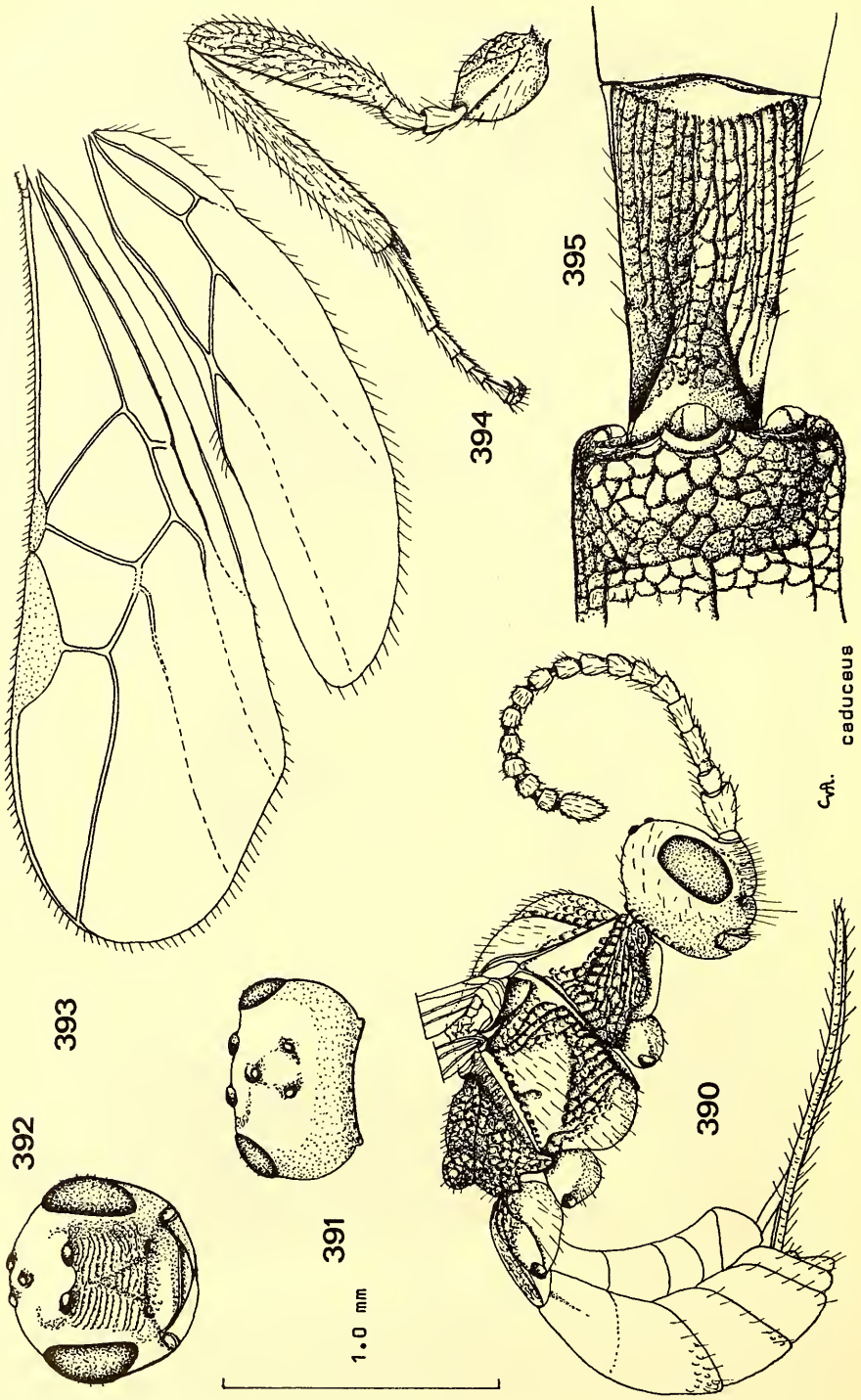

Fig. 390—395 (*Blacus* (*Blacus*) *caduceus* spec. nov., holotype. 390, habitus, lateral aspect; 391, head, dorsal aspect; 392, head, frontal aspect; 393, wings; 394, hind leg, lateral aspect; 395, propodeum (p.p.) and 1st tergite, dorsal aspect. 390, 393, 394: scale-line; 391, 392: 1.2 × scale-line; 395: 2.5 × scale-line

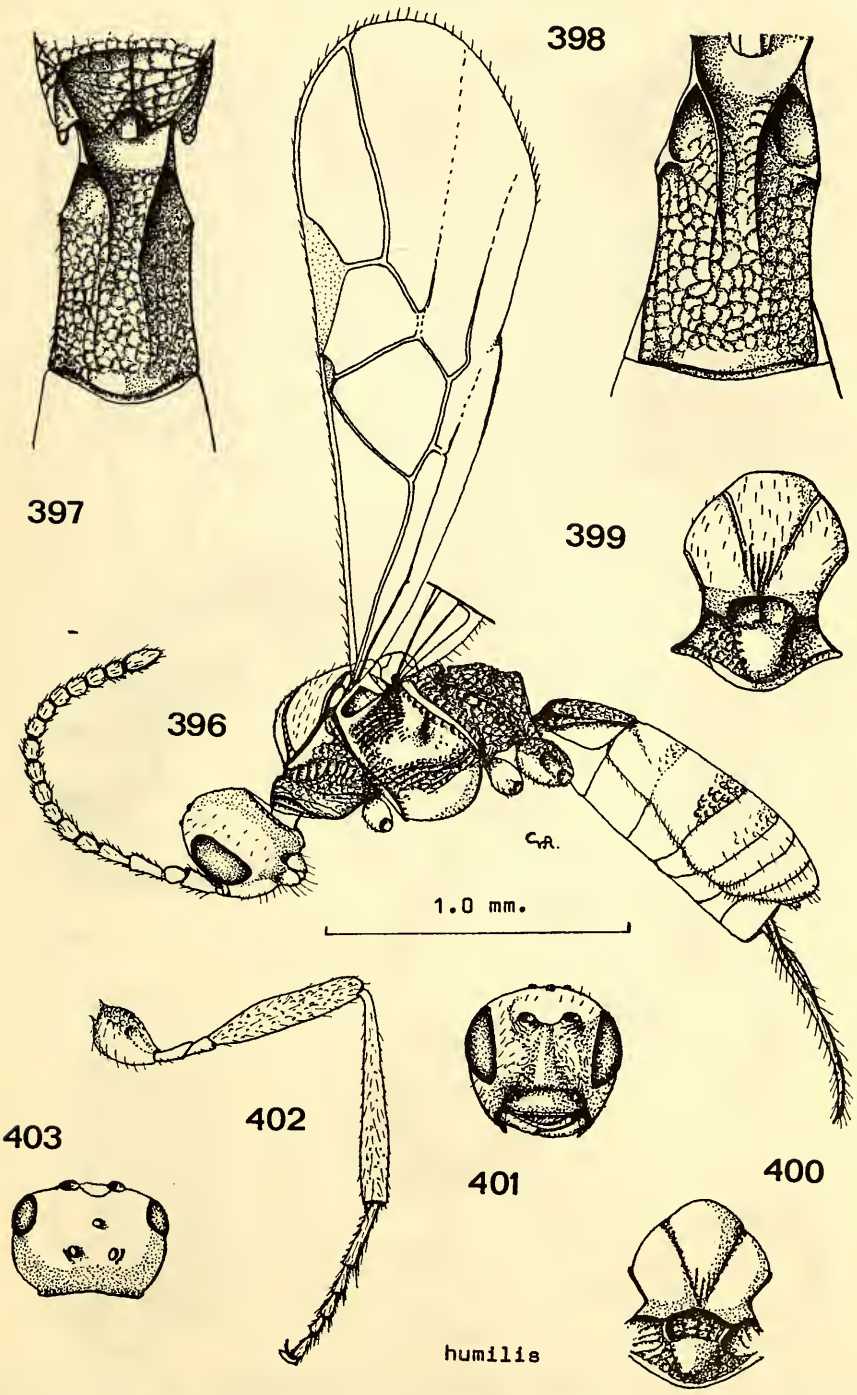

Fig. 396—403, *Blacus* (*Blacus*) *humilis* (Nees); 396, 397, 400—403, White Fox (Saskatchewan); 398, 399, ♀, Otterlose Bos (Netherlands). 396, habitus, lateral aspect; 397, propodeum (p.p.) and 1st tergite, dorsal aspect; 398, 1st tergite, dorsal aspect; 399, 400, mesonotum, dorsal aspect; 401, head, frontal aspect; 402, hind leg, lateral aspect; 403, head, dorsal aspect. 396, 402: scale-line; 397, 398: 2.5 × scale-line; 399—401, 403: 1.2 × scale-line

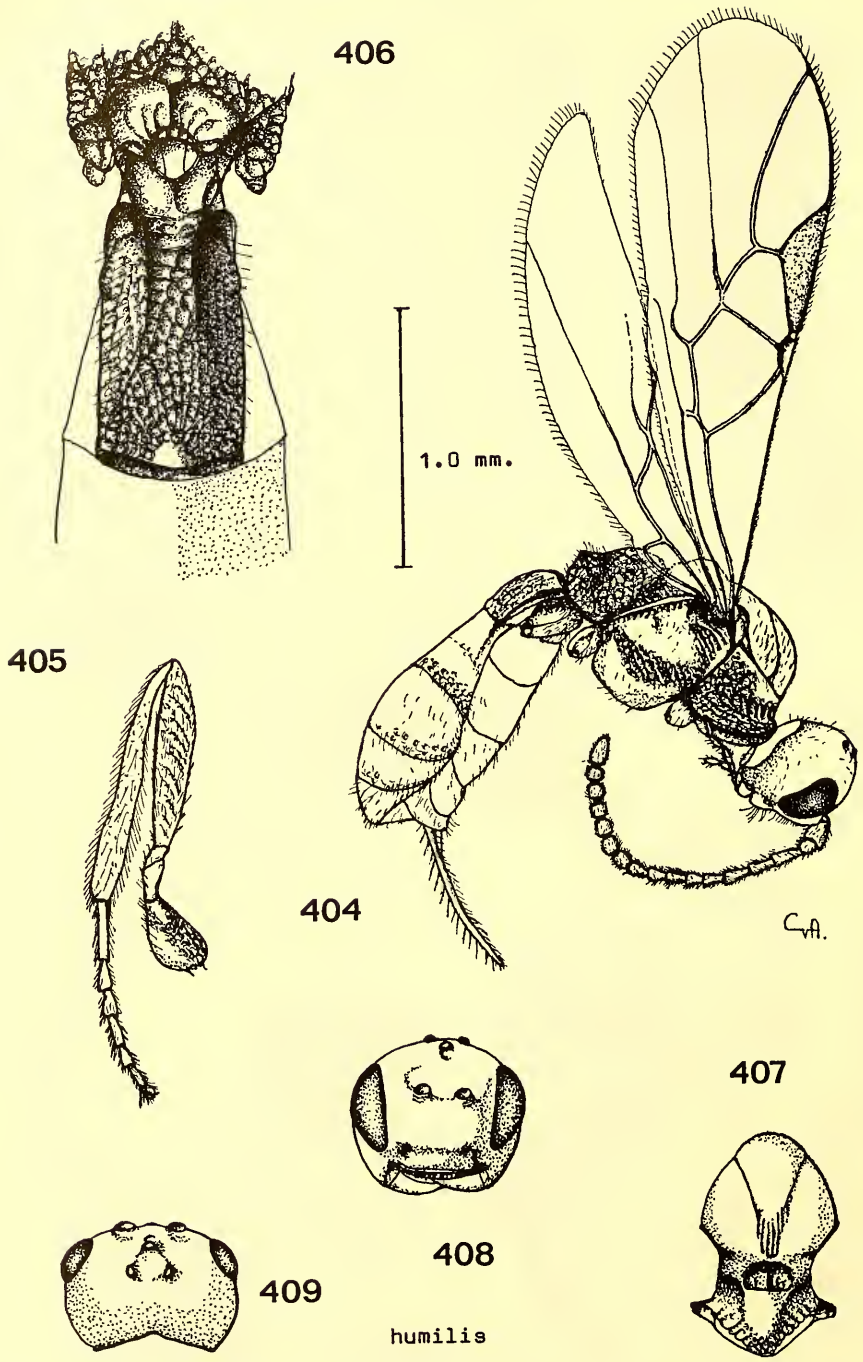

Fig. 404—409, *Blacus* (*Blacus*) *humilis* (Nees), slender form from Sta. Cruz (California). 404, habitus, lateral aspect; 405, hind leg, lateral aspect; 406, propodeum (p.p.) and 1st tergite; 407, mesonotum, dorsal aspect; 408, head, frontal aspect; 409, head, dorsal aspect. 404. 405: scale-line; 407—409: 1.3 × scale-line; 406: 2.8 × scale-line

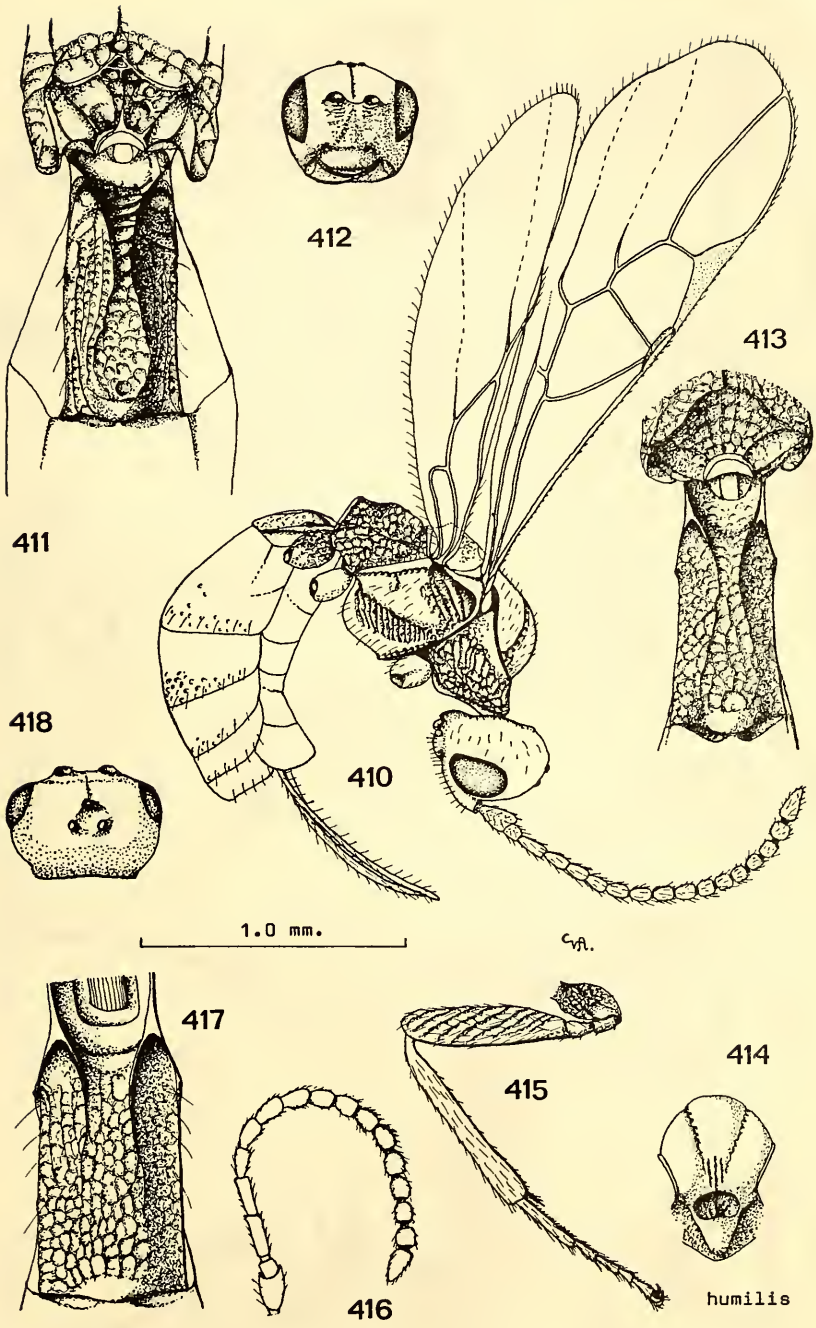

Fig. 410—418, *Blacus* (*Blacus*) *humilis* (Nees); 410, 411, 414, 415, ♀, Cacapon (West Virginia); 412, 416, 417, ♀, Old Chelsea (Quebec); 413, ♀, Hixon (British Columbia). 410, habitus, lateral aspect; 411, 413, propodeum (p.p.) and 1st tergite, dorsal aspect; 412, head, frontal aspect; 414, mesonotum, dorsal aspect; 415, hind leg, lateral aspect; 416, antenna, lateral aspect; 417, 1st tergite, dorsal aspect; 418, head, dorsal aspect. 410, 415, 416: scale-line; 411, 413, 417: 2.5 × scale-line; 412, 414, 418: 1.2 × scale-line

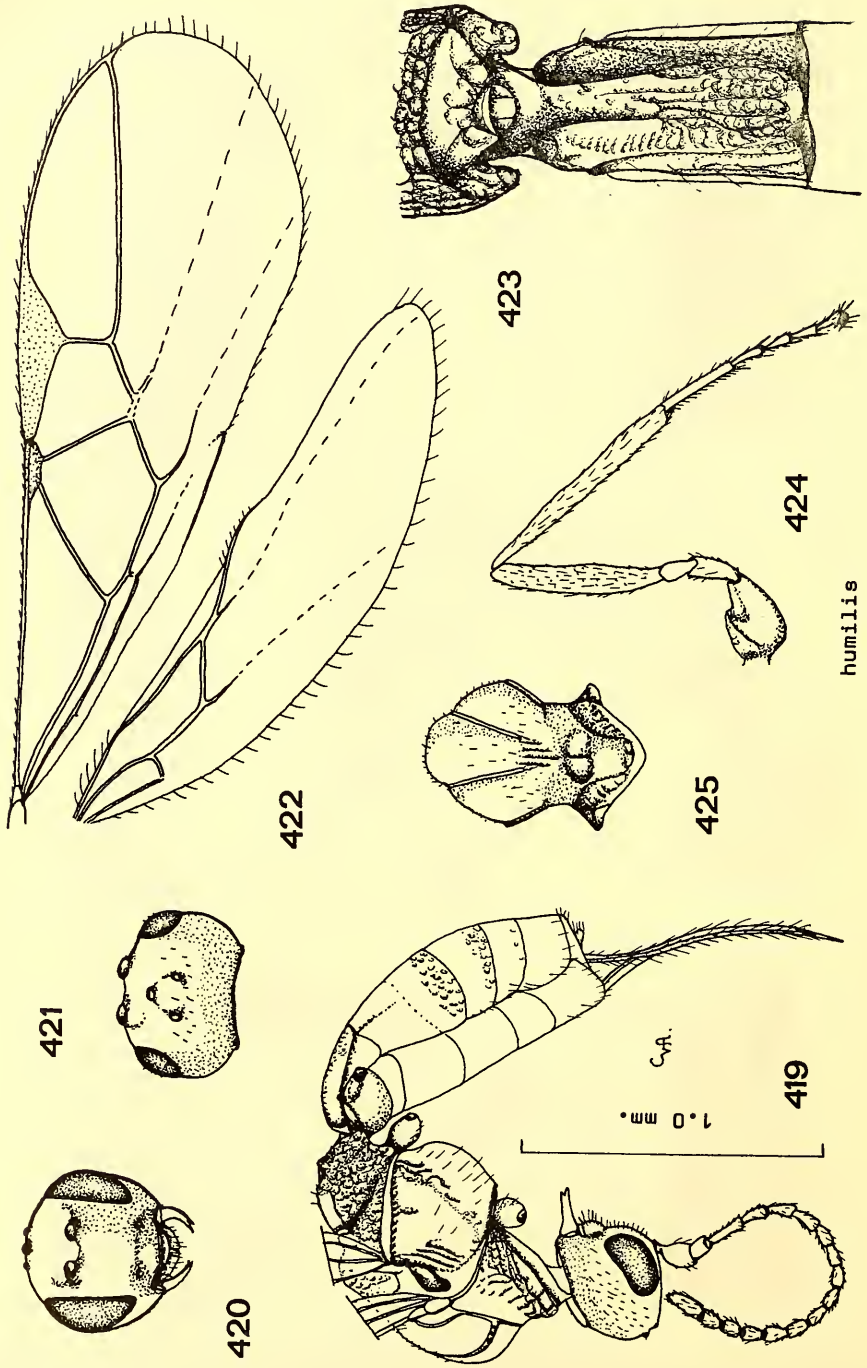

Fig. 419—425, *Blacus* (*Blacus*) *humilis* (Nees), slender form from Desierto Leones (Mexico). 419, habitus, lateral aspect; 420, head, frontal aspect; 421, head, dorsal aspect; 422, wings; 423, propodeum (p.p.) and 1st tergite, dorsal aspect; 424, hind leg, lateral aspect; 425, mesonotum, dorsal aspect. 419, 422, 424: scale-line; 420, 421, 425: 1.2 × scale-line; 423: 2.0 × scale-line

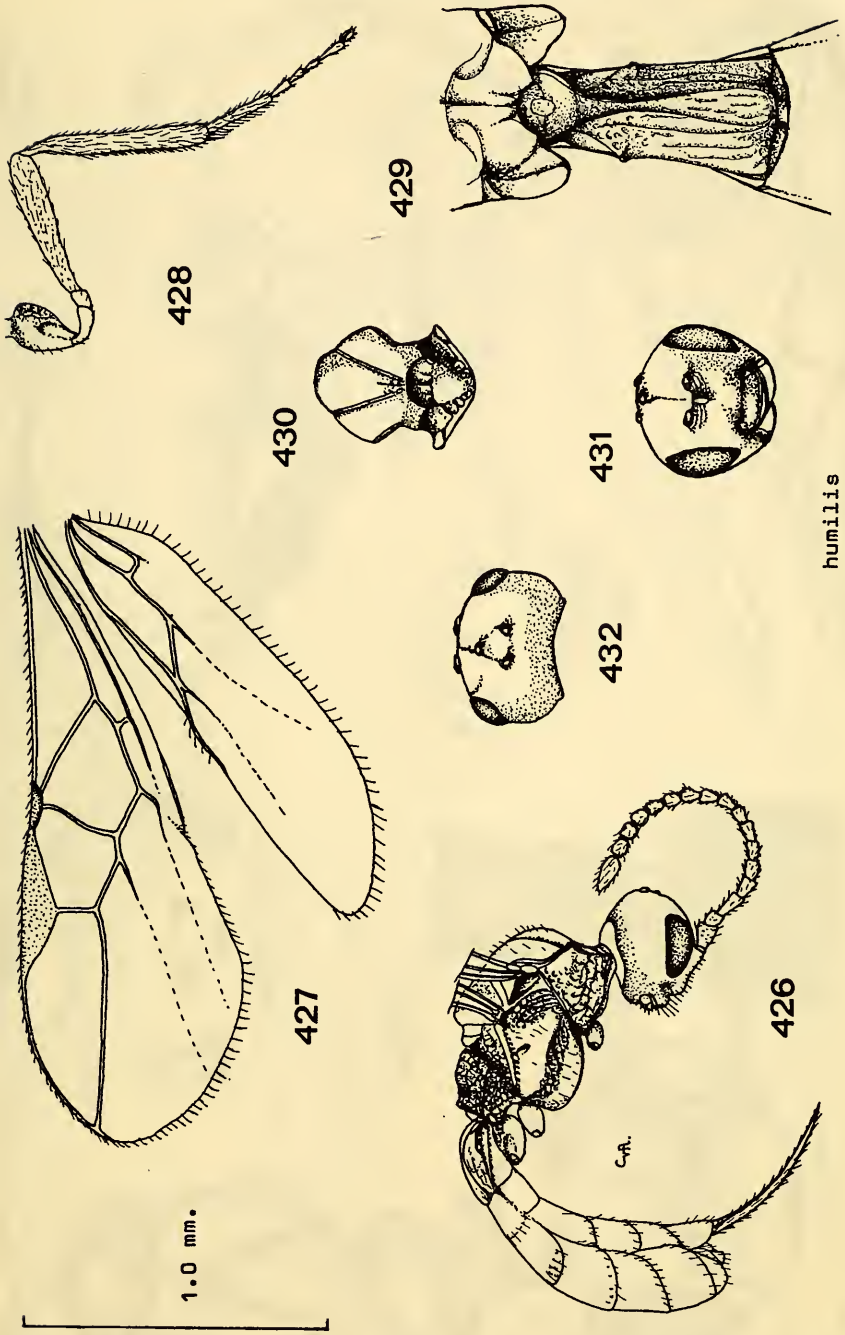

Fig. 426—432, *Blacus* (*Blacus*) *humilis* (Nees), small form from Cranberry Lake (New York). 426, habitus, lateral aspect; 427, wings; 428, hind leg, lateral aspect; 429, propodeum (p.p) and 1st tergite, dorsal aspect; 430, mesonotum, dorsal aspect; 431, head, frontal aspect; 432, head, dorsal aspect. 426, 428: scale-line; 430—432: 1.2 × scale-line; 429: 2.5 × scale-line

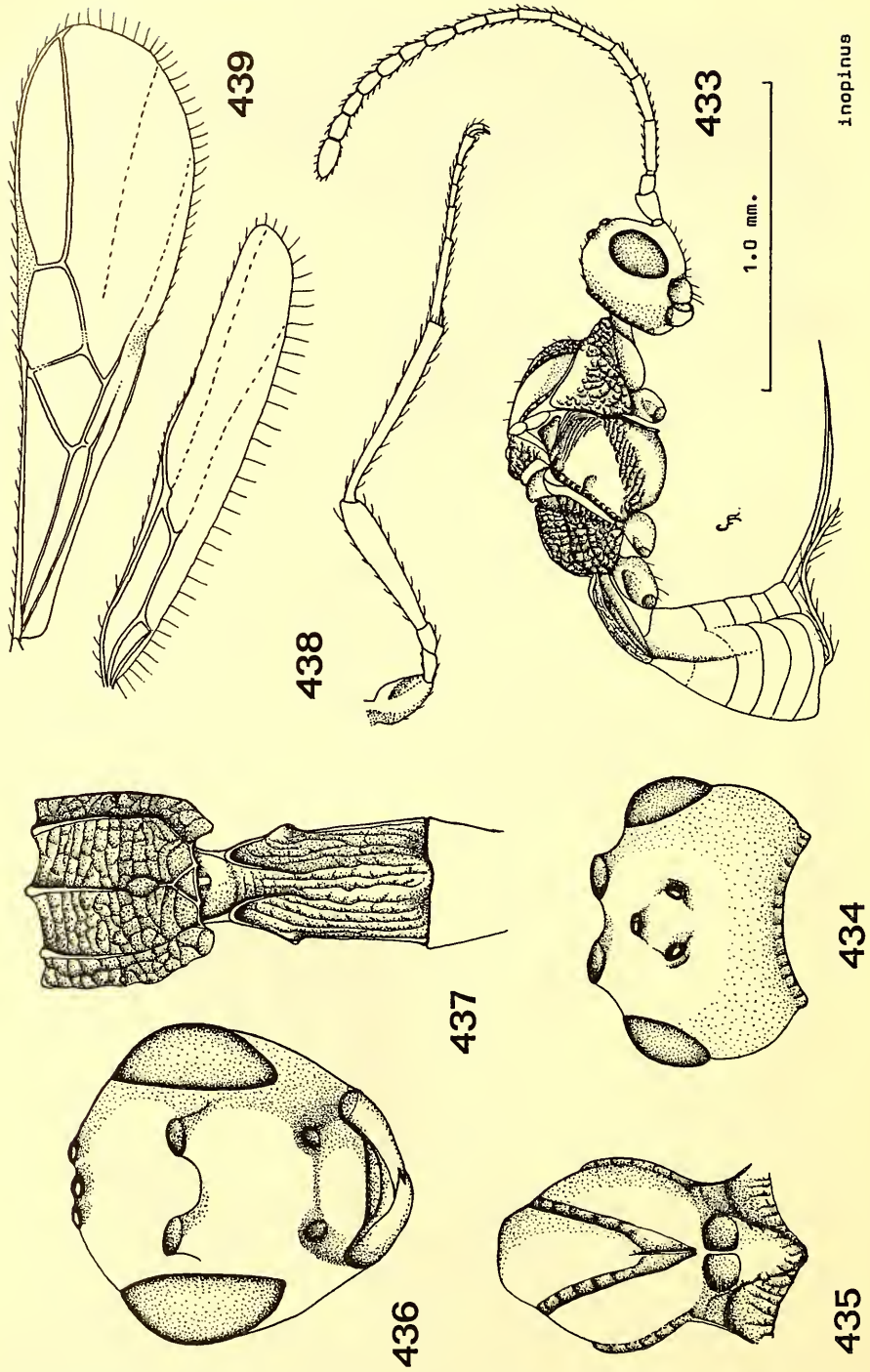

Fig. 433—439, *Blacus* (*Blacus*) *inopinus* spec. nov., holotype. 433, habitus, lateral aspect; 434, head, dorsal aspect; 435, mesonotum, dorsal aspect; 436, head, frontal aspect; 437, propodeum and 1st tergite; 438, hind leg, lateral aspect; 439, wings. 433, 438, 439: scale-line; 434, 435, 437: 2.1 × scale-line; 436: 2.5 × scale-line

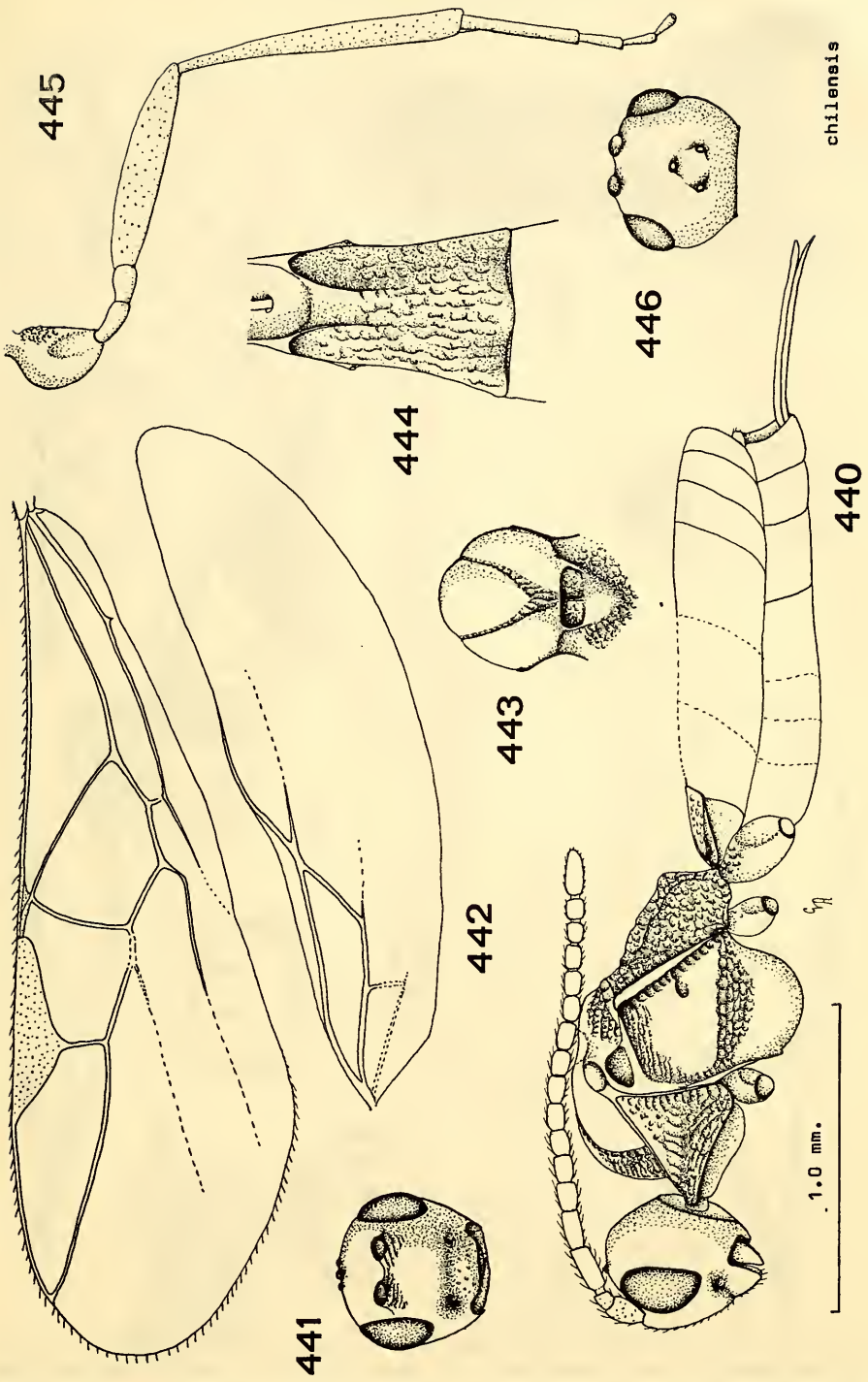

Fig. 440—446, *Blacus* (*Blacus*) *chilensis* spec. nov., holotype. 440, habitus, lateral aspect; 441, head, frontal aspect; 442, wings; 443, mesonotum, dorsal aspect; 444, 1st tergite, dorsal aspect; 445, hind leg, lateral aspect; 446, head, dorsal aspect. 440—443, 445, 446: scale-line; 444: 2.1 × scale-line

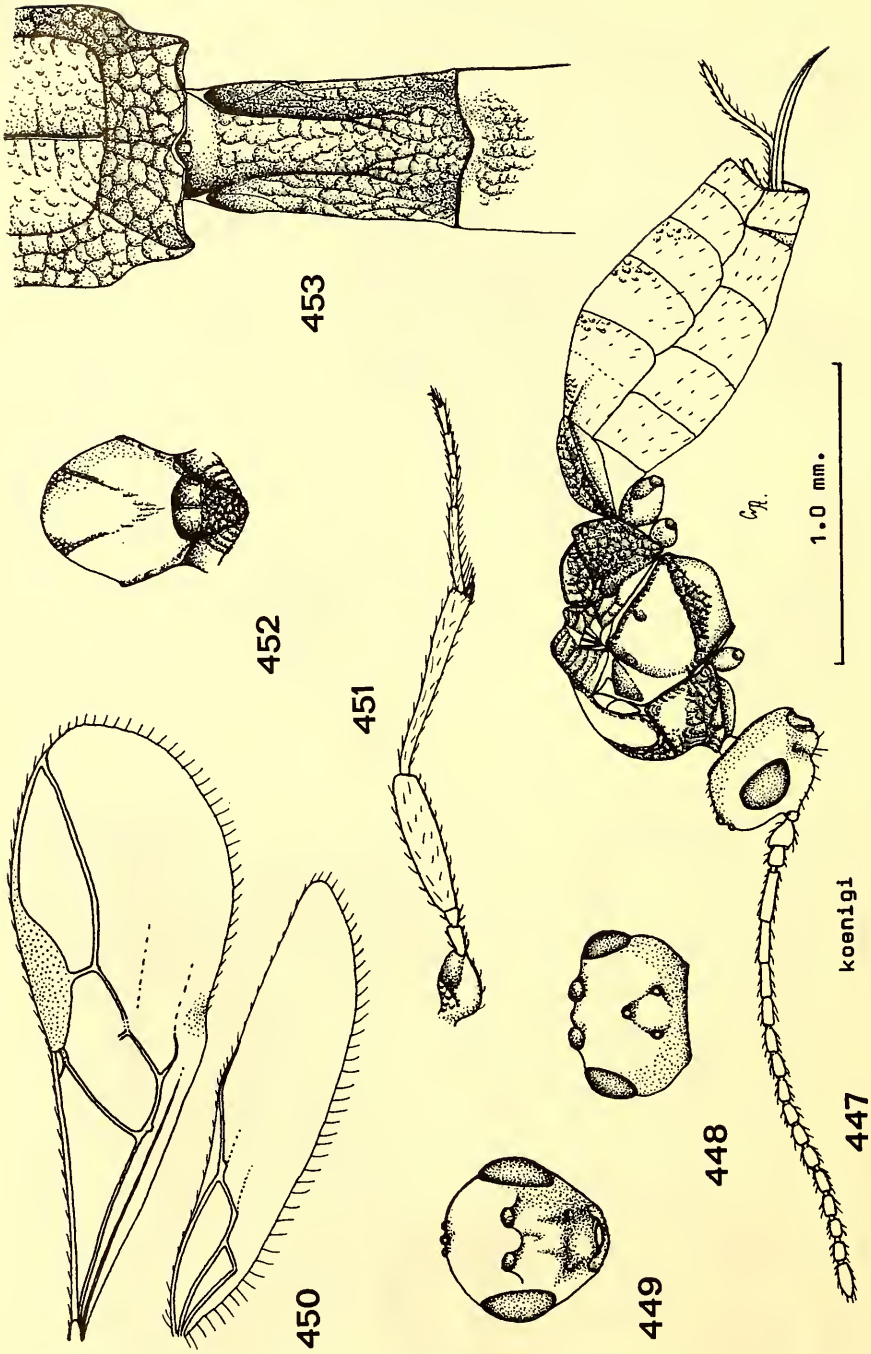

Fig. 447—453, *Neoblacus rufipes* Ashmead, neotype (= *koenigi*). 447, habitus, lateral aspect; 448, head, dorsal aspect; 449, head, frontal aspect; 450, wings; 451, hind leg, lateral aspect; 452, mesonotum, dorsal aspect; 453, propodeum, 1st and 2nd tergites, dorsal aspect. 447, 450, 451: scale-line; 448, 449, 452: 1.2 × scale-line; 453: 2.5 × scale-line

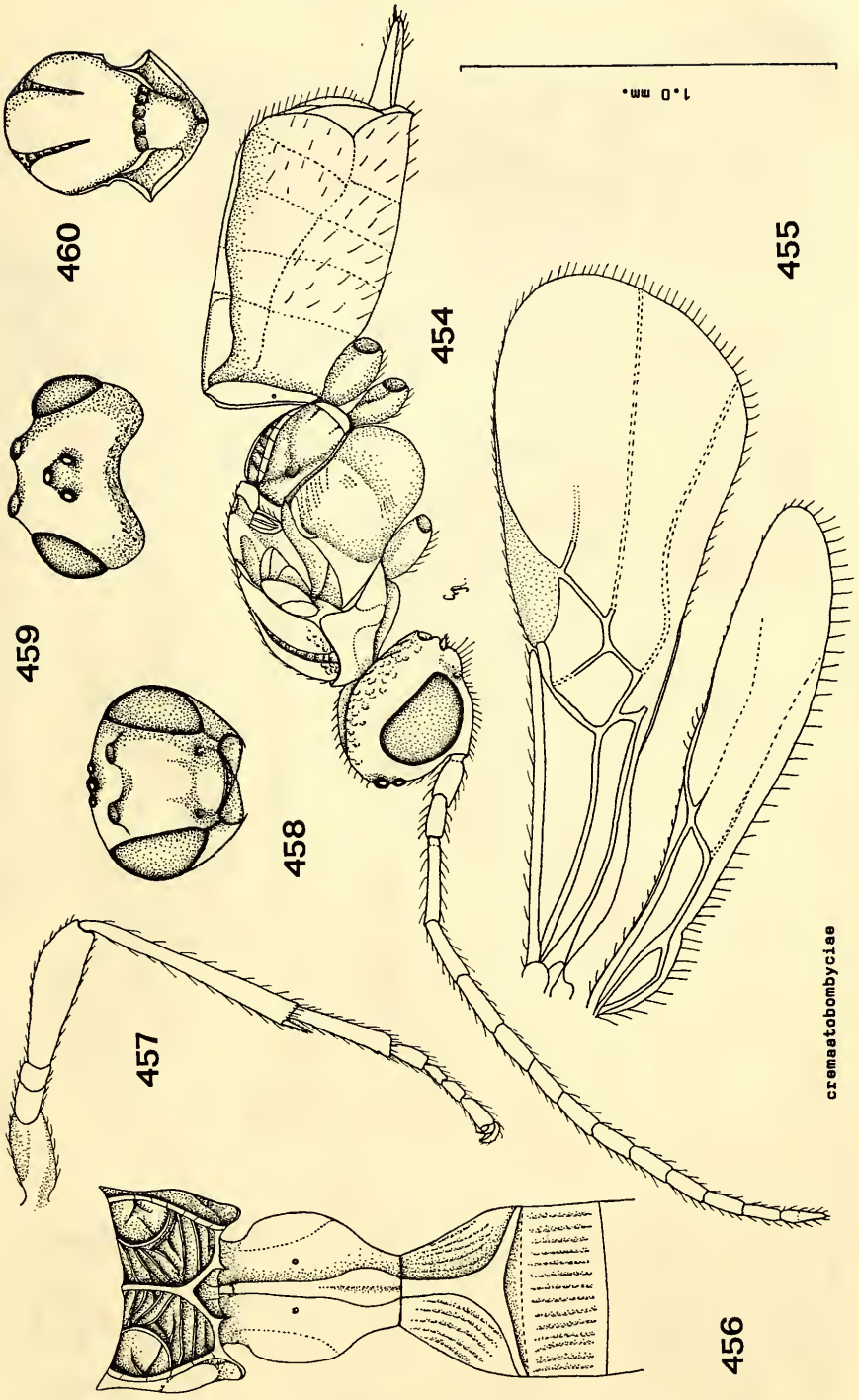

Fig. 454—460, *Mirax cremastobombyciae* (Fullaway), holotype. 454, habitus, lateral aspect; 455, hind leg, lateral aspect; 456, propodeum, 1st-3rd tergites, dorsal aspect; 457, hind leg, lateral aspect; 458, head, frontal aspect; 459, head, dorsal aspect; 460, mesonotum, dorsal aspect. 454, 455, 457—460: scale-line; 456: 1.5 × scale-line

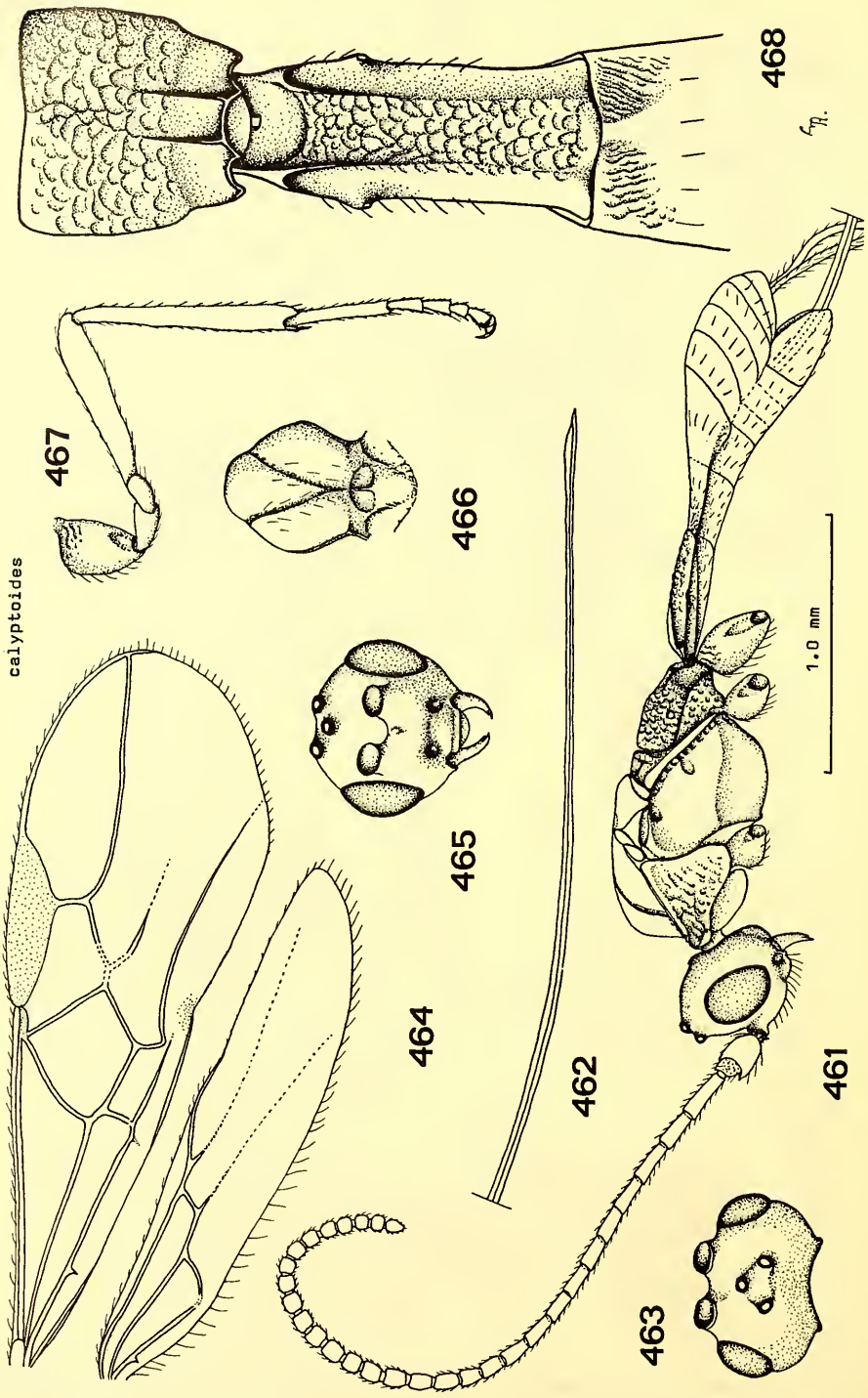

Fig. 461—468, *Stegnocella calyptoides* spec. nov., holotype. 461, habitus, lateral aspect; 462, ovipositor, lateral aspect; 463, head, dorsal aspect; 464, wings; 465, head, frontal aspect; 466, mesonotum, dorsal aspect; 467, hind leg, lateral aspect; 468, propodeum and 1st tergite, dorsal aspect. 461, 462, 464, 467: scale-line; 463, 465, 466: 1.2 × scale-line; 468: 2.5 × scale-line

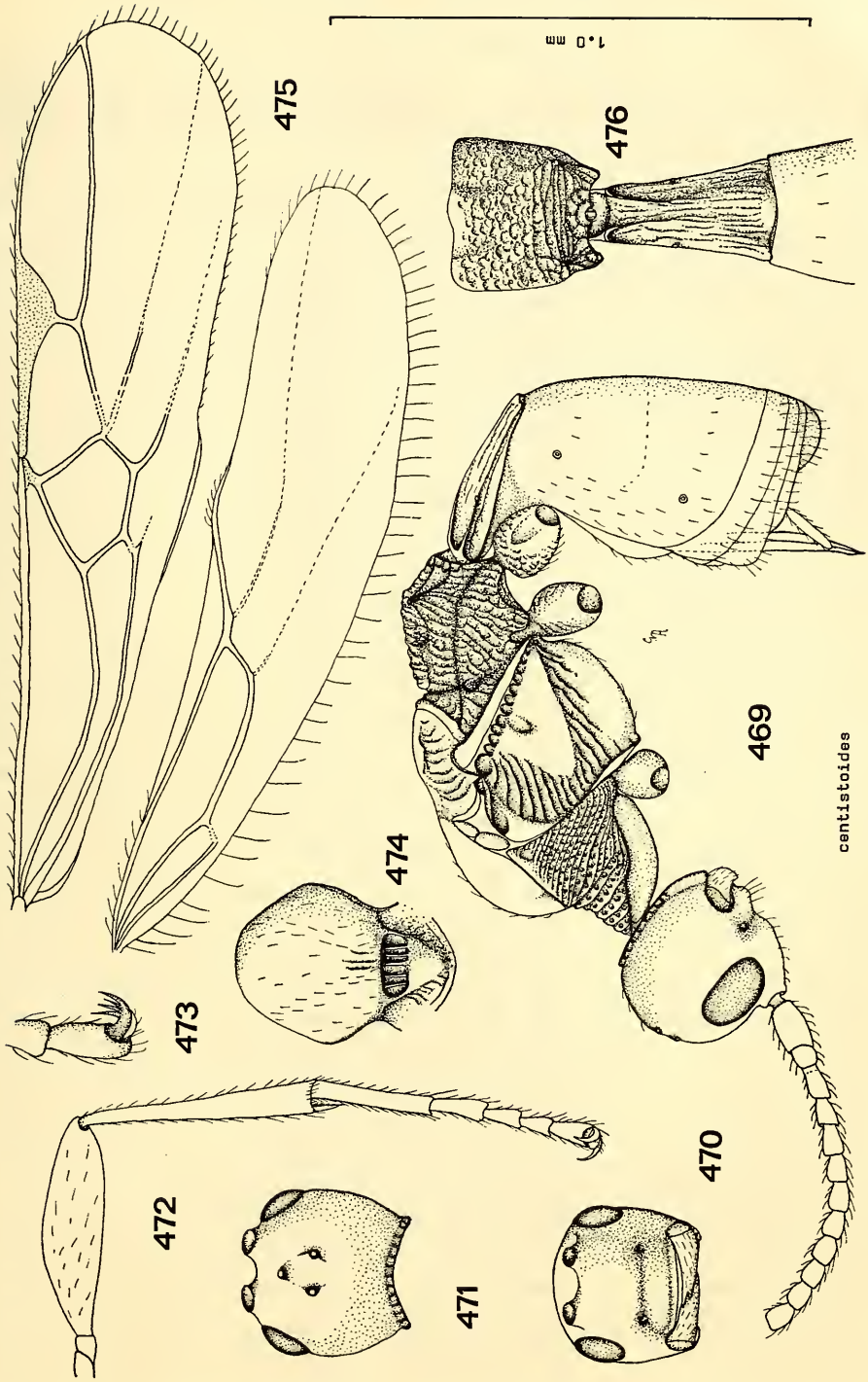

Fig. 469—476, *Apoblacus centistoides* spec. nov., holotype. 469, habitus, lateral aspect; 470, head, frontal aspect; 471, head, dorsal aspect; 472, hind leg, lateral aspect; 473, middle tarsal claw, lateral aspect; 474, mesonotum, dorsal aspect; 475, wings; 476, propodeum and 1st tergite, dorsal aspect. 469—472, 474, 475: scale-line; 473: 2.0 × scale-line; 476: 1.1 × scale-line

INDEX OF NAMES USED IN THE BLACINI

Pal. = Palaearctic; Nea. = Nearctic; Neo. = Neotropical; Eth. = Ethiopian; Ori. = Oriental; Pac. = Pacific; H = Holotype; L = Lectotype; N = Neotype. For the abbreviations of museums, etc. see the acknowledgements (p. 251).

Name	Type-locality	Type-location	Page
afflictus Curtis, 1837	nomen nudum	—	—
ambulans Haliday, 1835	Pal.: ?Ireland	?	212
andreei Brues, 1933	Pal.: Baltic Amber	lost	[1]
annulicornis Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	190
apaches spec. nov.	Pal.: Nepal	BM; ♀,H	213
apicalis spec. nov.	Pal.: Nepal	BM; ♀,H	193
apodastus spec. nov.	Nea.: Ontario	CNC; ♀,H	234
aptenodytes Marshall, 1889	Pal.: England	BM; ♀,?L	220
armatulus Ruthe, 1861	Pal.: Germany	BM; ♀,L	204
artomandibularis spec. nov.	Pal.: Nepal	BM; ♀,H	194
asaphus spec. nov.	Nea.: Manitoba	CNC; ♀,H	229
ashmeadii (Brues, 1933)	Pal.: Baltic Amber	lost	[1]
aulacis spec. nov.	Nea.: Mexico	CNC; ♀,H	181
barynoti (Boudier, 1834)	Pal.: France	?lost; ♂	250
bisstigmata (Say, 1836)	Nea.: Indiana	lost; ♂	203
bovistae Haeselbarth, 1973	Pal.: Switzerland	Genève; ♀,H	241
brachialis Rondani, 1876	Pal.: Italy	?lost	250
brevicornis Ruthe, 1861	Pal.: Germany	BM; ♀,L	238
caduceus spec. nov.	Nea.: West Virginia	USNM; ♀,H	237
calyptoides spec. nov.	Neo.: Chile	CNC; ♀,H	178
capeki Haeselbarth, 1973	Pal.: Czechoslovakia	Čapek Coll.; ♀,H	214
centistoides spec. nov.	Neo.: Chile	CNC; ♀,H	246
cerealis Curtis, 1860	Pal.: England	Melbourne; ♂,H	250
cerinus spec. nov.	Neo.: Brazil	BM; ♀,H	187
chilensis spec. nov.	Neo.: Chile	MCZ; ♀,H	243
chillcotti spec. nov.	Nea.: North Carolina	CNC; ♀,H	189
chinensis Watanabe, 1950	Pal.: China	?	250
cognatus spec. nov.	Nea.: Arizona	CNC; ♀,H	230
cohibilis spec. nov.	Nea.: Texas	CNC; ♀,H	228
collaris (Ashmead, 1894)	Nea.: St. Vincent	BM; ♀,H	208
compar Ruthe, 1861	Pal.: Germany	BM; ♀,L	212
compressiventris spec. nov.	Nea.: Quebec	CNC; ♀,H	182
conformis Wesmael, 1835	Pal.: Belgium	Brussels; ♂,L	214
constrictus spec. nov.	Neo.: Brazil	BM; ♀,H	188
convexus spec. nov.	Eth.: Madagascar	MAC; ♀,H	191
cracentis spec. nov.	Nea.: Mexico	CNC; ♀,H	201
crassicornis Brues, 1933	Pal.: Baltic Amber	lost	[1]
crassicrus spec. nov.	Nea.: Mexico	CNC; ♀,H	228
cremastobombyciae Fullaway, 1956	Pac.: Hawaii	BPBM; ♀,H	248
cuneatus Provancher, 1888	Nea.: Quebec	belongs to *Orgilus*	
decaryi Granger, 1949	Eth.: Madagascar	MNHN; ♂,H	191
defectuosus Provancher, 1886	Nea.: Ontario	PC; ♀,H	231
dentatus Hellén, 1958	Pal.: Finland	Helsinki; ♀,H	203
dilaticornis spec. nov.	Neo.: Brazil	BM; ♀,H	206
diversicornis (Nees, 1834)	Pal.: Germany	lost	212
dracomontanus Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	210
dubius Ruthe, 1861	Pal.: ?Germany	BM; ♂,L	242
epitolus spec. nov.	Neo.: Brazil	BM; ♀,H	209

[1]) Will be dealt with in a second paper.

errans (Nees, 1812)	Pal.: Germany	lost	241
erugatus spec. nov.	Neo.: Equador	CNC; ♀,H	190
exilis (Nees, 1812)	Pal.: Germany	Berlin; ♀,N	233
exocentri Giraud, 1877	nomen nudum	—	—
facialis Brues, 1933	Pal.: Baltic Amber	lost	[1])
filicornis Haeselbarth, 1973	Pal.: Germany	HC; ♀,H	240
fischeri Haeselbarth, 1973	Pal.: Austria	NMW; ♀,H	183
fissus spec. nov.	Neo.: Brazil	BM; ♀,H	202
floreus Rondani, 1878	?=*florus* Goureau	—	—
florus Goureau, 1851	Pal.: France	!lost	251
forticornis Haeselbarth, 1973	Pal.: England	BM; ♀,H	242
fritschii Brues, 1933	Pal.: Baltic Amber	lost	[1])
fulvicollis Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	184
fuscipes Goureau, 1862	Pal.: France	?lost	251
gelechiae Ashmead, 1889	Nea.: Missouri	belongs to *Orgilus*	
genalis Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	210
gibber Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	192
glabrum spec. nov.	Pal.: Nepal	BM; ♀,H	196
gracilicornis Brues, 1939	Pal.: Baltic Amber	Cambridge; ♀,H	[1])
gracilis Brues, 1908	Nea.: Minnesota	belongs to *Orgilus*	
gracilis Haeselbarth, 1973 [2])	Pal.: Germany	HC; ♀,H	185
grandior Brues, 1933	Pal.: Baltic Amber	lost	[1])
haeselbarthi spec. nov.	Eth.: Tanzania	MAC; ♀,H	210
hastatus Haliday, 1835	Pal.: England	?	240
humillimus Dalla Torre, 1898	Neo.: Chile	?lost	251
humilis (Nees, 1812)	Pal.: Germany	München; ♀,N	235
hostilis Haeselbarth, 1973	Pal.: Germany	Berlin; ♀,H	241
impennis Curtis, 1837	nomen nudum	—	—
inopinus spec. nov.	Eth.: Zaïre	Stam Coll.: ♀,H	242
instabilis Ruthe, 1861	Pal.: Germany	BM; ♀,L	240
interstitialis Ruthe, 1861	Pal.: Germany	BM; ♀,L	239
javensis spec. nov.	Ori.: Java	BM; ♀,H	184
kaszabi Haeselbarth, 1973	Pal.: Mongolia	TMA; ♀,H	212
koenigi Fischer, 1966	Pal.: Austria	NMW; ♀,H	244
koenigsmanni Haeselbarth, 1973	Pal.: Austria	NMW; ♀,H	212
lactucaphis (Fitch, 1855)	Nea.: New York	USNM; ♂,H	232
leptostigma Ruthe, 1861	Pal.: Germany	BM; ♂,L	240
lithocolletides Ashmead, 1910	nomen nudum	—	—
longicaudus Provancher, 1886	Nea.: Ontario	PC; ♀,H	249
longicornis (Brues, 1933)	Pal.: Baltic Amber	lost	[1])
longipennis (Gravenhorst, 1809)	Pal.: Germany	Berlin; ♀,N	242
maculipes Wesmael, 1835	Pal.: Belgium	Brussels; ♀,L	212
macropterus Haeselbarth, 1973	Pal.: Germany	HC; ♀,H	212
mallochi (Viereck, 1913)	Nea.: Virginia	USNM; ♀,H	217
mamillanus Ruthe, 1861	Pal.: Germany	BM; ♀,L	220
maryi Hellén, 1958	Pal.: Finland	Helsinki; ♀,H	227
masoni spec. nov.	Nea.: Quebec	CNC; ♀,H	235
mischocytus spec. nov.	Ori.: Java	BM; ♀,H	214
modestus Haeselbarth, 1973	Pal.: Germany	HC; ♀,H	241
monostigmaticus spec. nov.	Neo.: Chile	CNC; ♀,H	180
multiarticulatiformis Shenefelt, 1969	Pal.: Baltic Amber	lost	[1])
multiarticulatus Ratzeburg, 1852	Pal.: Germany	belongs to *Pygostolus*	
nanulus Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	192
nanus Ashmead in Nason, 1905	nomen nudum	—	233
natalensis Brues, 1926	Eth.: S. Africa	Durban; ♀,H	250
nidicola Hedqvist, 1974	Pal.: Sweden	Hedqvist Coll.: ♀,H	226

[2]) Will be renamed by Haeselbarth.

nigricornis Haeselbarth, 1973	Pal.: Austria	HC; ♀,H	241
nitidus Haeselbarth, 1973	Pal.: Italy	HC; ♀,H	213
nixoni Haeselbarth, 1973	Pal.: Cyprus	BM; ♀,H	211
oscinellae Fischer, 1963	Pal.: Czechoslovakia	Genève; ♀,H	239
otiorhynchi (Boudier, 1834)	Pal.: France	belongs to *Pygostolus* [3])	
paganus Haliday, 1835	Pal.: ?Ireland	?	238
pallens Hedwig, 1957	Pal.: Iran	belongs to Braconinae	
pallidipes Dalla Torre, 1898	emendation of *pallipes* (Foerster, 1862)		233
pallipes Haliday, 1835	Pal.: ?Ireland	?	213
pallipes Foerster, 1862	Pal.: Germany	Berlin; ♀,L	233
pappianus Haeselbarth, 1973	Pal.: Hungary	TMA; ♀,H	240
parvus Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	184
patulus spec. nov.	Nea.: British Columbia	CNC; ♀,H	219
pectinatus Haeselbarth, 1973	Pal.: Austria	NMW; ♀,H	214
petiolatus Haeselbarth, 1973	nomen nudum		
procerus Haeselbarth, 1973	Pal.: Kasachstan	Leningrad; ♀,H	241
propallipes Shenefelt, 1969	new name for *pallipes* (Foerster, 1862)		233
psichora spec. nov.	Neo.: Argentina	MCZ; ♀,H	176
pulcher Szépligeti, 1905	Ori.: Singapore	TMA; ♂,H	250
radialis Haeselbarth, 1973	Pal.: Kasachstan	Leningrad; ♀,H	241
redactus spec. nov.	Nea.: Michigan	SC; ♀,H	218
robustus Haeselbarth, 1973	Pal.: Czechoslovakia	Čapek Coll.: ♀,H	220
rubriceps Ashmead, 1894	Nea.: St. Vincent	BM; ♂,H	250
rufescens Ruthe, 1861	Pal.: Germany	BM; ♂,L	239
ruficornis (Nees, 1812)	Pal.: Germany	lost	203
rufipes (Ashmead, 1889)	Nea.: Indiana	USNM; ♀,H	232
rufipes (Ashmead, 1900)	Nea.: Ontario	CNC; ♀,N	244
schimitscheki Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	192
schwenkei Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	193
scitus Curtis, 1837	nomen nudum	—	—
sollicitis Curtis, 1837	nomen nudum	—	—
spinarius spec. nov.	Neo.: Brazil	CNC; ♀,H	247
spinifer Thomson, 1892	Pal.: Sweden	Lund; ♀,H	239
stami spec. nov.	Eth.: Zaïre	Stam Coll.: ♀,H	215
stelfoxi Haeselbarth, 1973	Pal.: England	BM; ♀,H	241
striatus spec. nov.	Nea.: Nova Scotia	CNC; ♀,H	207
strictus Curtis, 1837	nomen nudum	—	—
strictus Stelfox, 1941	Pal.: Ireland	Dublin; ♀,H	211
suberivorae Fulmek, 1962	nomen nudum	—	—
subquadratus Papp, 1971	Pal.: Mongolia	TMA; ♀,H	240
terebrator Ruthe, 1861	Pal.: Germany	BM; ♂,L	239
thoracicus spec. nov.	Nea.: Mexico	CNC; ♀,H	205
tobiae Haeselbarth, 1973	Pal.: Kasachstan	Leningrad; ♀,H	240
townesi Haeselbarth, 1974	Eth.: S. Africa	HC; ♀,H	193
transversus spec. nov.	Eth.: Madagascar	MAC; ♀.H	192
trapezoides spec. nov.	Nea.: Mexico	CNC; ♀,H	218
tricuspidatus (Kirchner, 1867)	nomen nudum	—	—
tripudians Haliday, 1835	Pal.: Ireland	?	212
trivialis Haliday, 1835	Pal.: ?Ireland	?	235
tuberculatus Wesmael, 1835	Pal.: Belgium	Brussels; ♀,L	213
vagans Ruthe, 1861	Pal.: ?Germany	?BM	241
varius Haeselbarth, 1973	Pal.: Germany	HC; ♀,H	211
wesmaeli Ruthe, 1861	Pal.: ?	?	251

[3]) See Haeselbarth, 1971.

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSE ENTOMOLOGISCHE VERENIGING

REGISTER VAN DEEL 118

* Een sterretje duidt een naam aan, welke nieuw is voor de wetenschap.

* An asterisk denotes a name new to science.

Uit dit register zijn weggelaten de namen uit het artikel van Van Achterberg, welke reeds zijn opgenomen in het eigen register.

DIPTERA

atlantica 67
brolemanni 80
czizeki 67, 68, 80, 81 83 et [seq.
hungarica 67
italica 67
kleinschmidti 67, 85, 95
luteipennis 80
mediterranea 67, 85, 86, 95
oleracea 67 et seq., 83 et seq.
orientalis 67, 85
paludosa 67, 68, 80, 81, 83 [et seq.
plumbea 67, 85
Tipula 67 et seq., 83 et seq.

HEMIPTERA
HETEROPTERA

adonis 44
aegyptia 53
aeneipes 48
africanus (na) 56, 57
Agraptocorixa 43
albolineolata 53
* ssp. ampliata [(D. africana) 57
Anisops 44
ater 44
bergevini 45
* ssp. bouakeanus [(N. bergevini) 45
* ssp. breviscutum [(C. melanacantha) 64
Caprivia 44
* carayoni 54, 56
Carbula 64
ssp. chabanaudi [(H. aegyptia) 53
chopardi 53
* cobbeni 46
columbiae 44
congoensis 44
dakarica 43
Daladeropsis 56 et seq.
debilis 44
dentiventris 52
dispar 56, 57, 64
emaciata 44
Enithares 44
gracillima 48
ssp. guineensis [(R. emaciata) 44
Hebrovelia 54
hutchinsoni 44
hutereauae 56,57,62
Hydrocyrius 44
Hydrometra 53
Hynesionella 46
jaczewskii 44
Laccotrephes 44
lanceolata 44
limpida 44
machadoi 50, 52
maculata 48
major 48
melanacantha 64
Mesovelia 52
Micronecta 43
Microvelia 48, 50
* ssp. mollis [(M. dentiventris) 52
Naboandelus 45
Naucoris 44
Neonychia 44
nepoides 44
Nychia 44
obscuratus 44
parvipes 44
* pelops 61
pellucens 44
* pilipes 48, 52
Plea 44
protrusa 43
pullula 44
quewalepele 43
Ranatra 44
Rhagadotarsus 44
Rhagovelia 48
rhodesiana 53
sardea 44
scutellaris 43
singularis 56
sobria 44
Sphaerodema 44
Stenocorixa 43
Trichovelia 48, 50
* troilos 50, 52
urundii 50, 52
usingeri 56
ssp. vicina (R. parvipes) 44
vittigera 52
waelbrocki 48

HEMIPTERA
HOMOPTERA

Acaudus 99 et seq.
aconiti 100, 101, 102
amygdalinus 99
Appelia 99
ballotae 103
bicolor 102
Brachycaudus 99 et seq.
Brevicaudus 99
cardui 99, 102, 103
cerinthis 99
divaricatae 100, 101 nota
helichrysi 99
iranicus 99, 100
jacobi 99, 102
klugkisti 100, 101, 107
lamii 99, 102
lateralis 99

linariae 103
lucifugus 99 nota, 103
lychnicola 99, 100, 101
lychnidis 100, 102, 103
malvae 103
mimeuri 99
mordvilkoi 103
napelli 99, 100, 101
persicae 99, 102
persicaecola 99, 115
populi 99, 100, 101, 111
prunicola 99
rumicicolens 99
salicinae 99
semisubterraneus 99
spiraeae 99
Thuleaphis 99
virgatus 99

HYMENOPTERA

argentinus 19, 34
* aureolus 19, 30
aurifrons 18, 27
* auriger 18, 25
* auriventris 20, 37
barthi 3, 8
* canalicus 18, 25
carolina 17, 22
claviventris 18, 29
* eliasi 19, 38
* erythrocnemus 4, 13
erythropoda 3, 5
ferrugineus 17, 22
* funicularius 19, 33
irwini 3, 7
kohlii 17, 22
longiventris 18, 23
* magnificus 19, 34
metallicus 3, 7
monticola 3, 4
montivagus 4, 11
* paranaensis 4, 11
pulcher 4, 9
Psen 2 et seq.
Pseneo 15 et seq.
punctatus 17, 20
simplicicornis 17, 20
striolatus 3, 5
taschenbergi 20, 35
unifasciculatus 4, 11
venetus 4, 9

ORTHOPTERA

* ssp. aberrans
[(O. ruficeps) 1, 25
* alata 139
* ssp. bicolor
[(O. uniformis) 133
bougainvillea
[(Bumacris) 147
bougainvillea
[(Opiptacris) 136
Bumacris 139
castanea 138
* ssp. cephalica
(O. uniformis) 131
* choiseulensis 134
* Cristovalacris 152
* ssp. fauroensis
[(O. bougainvillea) 138
* ssp. femorata
[(O. bougainvillea) 137
flavomaculata 142
ssp. georgica
[(O. uniformis) 131
hilaris 122
* ssp. kolombangarae
[(B. pagdeni) 151
leveri 148
monotona 144
* ssp. mundae (B. pagdeni)
[151
* novageorgica 127
Opiptacris 118
pagdeni 149
* rendovae 146
ruficeps 123
Salomonacris 118
* ssp. striata
[(O. uniformis) 134
* tenuis 125
* ssp. tricolor
[(O. uniformis) 132
tulagii 127
* unicolor 135
uniformis 130
* vellavellae 129
* venosa 152

PLANTAE

Aconitum 101, 102
Amygdalus 102
Anchusa 103
Anchusa italica 100
Ballota 103
Cerinthe 102
Echium 103
Euphrasia 102, 115, 116
Euphrasia lutea 115
Lamium 102
Linaria 103
Lindelofia 102
Lychnis alba 104
Lychnis flos-cuculi 101
Malva 103
Melampyrum 102, 115
Melampyrum pratense 116
Melandrium album 101,
[104 et seq.
Melandrium rubrum 101,
[104 et seq.
Myosotis 102
Parentucellia latifolia 115
Plantago lanceolata 103
Populus nigra 111, 112, 113
Prunus 102, 103, 115
Prunus armeniaca 116
Prunus persica 116
Pulmonaria 102
Rhinanthus 102, 115
Rhinanthus glaber 116
Silene 102
Silene dichotoma 105
Silene vulgaris 101, 113
[et seq.

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